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DISCOVERY

A Monthly Popular Journal of Knowledge

February 1936 — One Shilling

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(*Continued on page xv*).

DISCOVERY

A Monthly Popular Journal of Knowledge

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Notes of the Month.

A good deal of nonsense has been talked and written about "preserving the face of the English countryside as it has always been." Actually the appearance of rural England has changed many times during the past thousand years, and the aspect which most of us are now anxious to preserve does not date from farther back than the 18th century. Let us be candid and admit that what we wish to keep is not so much an unchanging countryside as a reasonable prospect of free enjoyment of it for the majority of the people. Indiscriminate building, whether sporadic or ribbon-wise, implies enclosure and trespass, and is therefore to be deplored; but what is now more dangerous is the callous acquisition by government departments of wastes that are useless for building and are consequently preserves for wild Nature that cannot cope with urbanisation. To-day's bogey is the Air Ministry, which threatens to absorb such small stretches of our coastline as are not suitable for week-end bungalows, and use them as practice ranges for bombing planes.

* * * *

The case of the Abbotsbury Swannery and Chesil Bank has been already discussed *ad nauseam*; but that was only the first. Now it is proposed to segregate Dengie Flats, on the Essex coast, and a large area of sandy links on the Northumberland shore, both of them areas particularly notable for the number and variety of their wild fowl. As the Secretary of the British Field Sports Society has pointed out, Dengie Flats almost adjoin the War Office artillery range at Foulness, which is hedged about by warning placards, and it would not seem impossible to arrange some scheme by which the two arms could use the same range at different times. The stretch of Northumbrian shore from Goswick Sands to Budle Bay intersects the causeway from Holy Island to the mainland and the establishment of a bombing range here would certainly discourage the few summer visitors that the island can accommodate. Further threats of bombing are made against the grim loneliness of Hell's Mouth, in the Lleyn, and against the tranquil shores of Luce Bay in Galloway. We can foresee the day when the British coasts will be divided between (*a*) seaside settlements, (*b*) gunnery and bombing ranges, and (*c*) the National Trust, that timely guardian of the right of public access.

* * * *

The opening of the Fire Offices' Committee Testing Station, at Boreham Wood, Herts, marks an important advance in the work of fire prevention in Britain. Since 1925 the Committee has operated a station at Manchester for testing fire-fighting appliances, but the enormous increase in building construction demanded new premises nearer London, within easy reach of the various interests involved. The Station comprises two buildings, the Appliances Building and the Fire Testing Building. In the former is the ingenious Water Distribution Room, for testing the uniformity of distribution of water from fire-sprinklers; also a laboratory

January 20, 1936.

DISCOVERY records with deep regret the death of His Majesty King George V, and joins with all loyal subjects of the British Empire in wishing long life and prosperity to His Majesty King Edward VIII.

for examining chemical extinguishers. The other building, in order to meet the requisite testing conditions, had to have equipment designed for heating to a maximum temperature varying between 1,000° F. and 2,300° F., and for the subjection of certain structures to a water test immediately after the heating period. A remote control room, with a universal recording-instrument board, is arranged in such a way that from it the whole floor of the Testing Building can be surveyed.

* * * *

At a recent meeting the Linnean Society held a symposium to discuss the changes in the British fauna and flora during the past fifty years. DISCOVERY has dealt with various aspects of this subject from time to time, but it is particularly convenient to have the whole chain of evidence available within one cover. The matter was treated under six heads, each by an authority on the section concerned : *Mammals*, by M. A. C. Hinton ; *Birds*, by W. B. Kinnear ; *Insects*, by K. G. Blair ; *Flowering Plants*, by A. J. Wilmott ; *Marine Algæ*, by A. D. Cotton ; and *Fungi*, by J. Ramsbottom. Professor F. E. Weiss suggested that further detailed researches were essential, and the President (Dr. W. T. Calman) pointed out what is often apt to be forgotten, that human intervention, important though it is, is by no means the only cause of the increase or diminution of species. Even if the British Isles had been uninhabited, very similar changes might have occurred in a period of fifty years. The papers read, along with much other interesting matter, are published in the *Proceedings* of the Society (148th Session, Part 1), sold at the Society's rooms (3*s*.), Burlington House, London, S.W.1.

* * * *

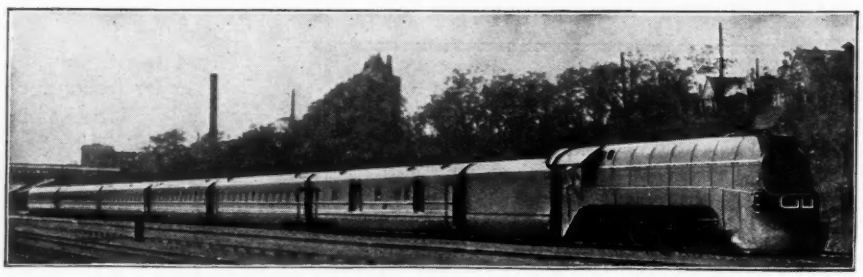
By publishing extracts from the Diary of a young friend of the family, *The Times* has done much to dispel the legend of hideous brutality attaching to the name of Captain William Bligh, R.N., commander of the *Bounty*. The presentation of a spectacular film and the publication of a highly-coloured account of the events concerned has focussed more than the usual amount of public attention on an unfortunate episode in this officer's career. Bligh was undoubtedly a martinet, as appears even in the Diary mentioned, but, as stated in our article on Pitcairn Island last month, the mutiny was due more to the unbearable contrast between the ordinary discipline and short rations of a man-of-war and the tropical delights of Tahiti, rather than to any extra special brutality on Bligh's part. The fact that both midshipmen and as many of the crew as a boat could hold remained loyal to their commander when Christian's party mutinied, argues that something, at any rate, was to be said for the other side.

* * * *

Research into historical matters sometimes leads to unromantic goals ; and the recent investigations made by the Royal United Service Institution, in connection with the Crimean exhibition at their Whitehall museum, have dispelled a cloud of legend that hung over the famous charge of the Light Brigade. The bugle in the Museum, used by Trumpet-Major Joy of the Cavalry Division, was formerly described as that " upon which the Balaclava charge was sounded " ; now it bears the less romantic label : " used during the battle of Balaclava." The " Charge " was never sounded there ; it is probable that Joy, as trumpeter in attendance on Lord Lucan, commander of the Cavalry Division, was ordered to sound the " Advance," a call that would be repeated by the trumpeters of the various formations engaged. But it seems conclusive that the fatal charge was not due to a mistaken order from headquarters.

* * * *

War on the Little Owl has begun in earnest, the Ministry of Agriculture having declared the bird an outlaw for five years. Any local authority may now, on application to the Ministry, take the bird off the protected list for that period. We suspect that the map published in DISCOVERY (Oct., 1935) will soon have to be revised. The *Christchurch* (*N.Z.*) *Star-Sun*, commenting on our article, reveals that this same bird, introduced into New Zealand thirty years ago, has been accused there also of destroying small native birds.



A streamlined express on the Dairen-Harbin Railway in Manchukuo, a Japanese constructed train on the model of the latest American rolling-stock.

[*By courtesy of the Editor of " La Science et la Vie."*]

King George V.

THE long annals of the British monarchy contain no parallel to the volume of personal grief which has been called forth by the death of King George V. No man, woman, or child, of the uncountable millions of our fellow-subjects throughout the Empire who were linked by wireless on the night of January 20th in a common bond of mourning, almost, as it seemed, at the King's death-bed, can ever forget that intensely solemn and intimate experience. To most of the listeners it was not merely the death of a sovereign; it was the passing of a man in whom all recognised the title to fathership of the Imperial family, which the King, with proud humility, had accepted in one of his Christmas broadcasts.

A large proportion of the men and women who are now in mourning lived in two other reigns. Queen Victoria had become an almost legendary figure at the time of her death, and King Edward VII had the sort of radiant personality which makes for general popularity. King George, however, had been either seen or heard by far larger numbers of his people than either Queen Victoria or King Edward VII. King George enjoyed the advantage denied to any of his predecessors of visiting every part of the oversea Empire before he ascended the throne. On becoming King he established a new precedent in constitutional monarchy by showing himself to his people in virtually every part of the British Isles, and more particularly in the thickly populated industrial areas. Finally, he forged a still more vital link by his periodical addresses to his people through the broadcasting transmitter. The nations under his sway, by means of this wonderful invention perfected during his reign, felt more than ever before that they knew their King personally, and realised instinctively that he was a good man to whom they could give not only their trust but their love.

If it is the man who was chiefly mourned at the moment of his passing, it is the King who hardly made a single mistake as a constitutional monarch in times of unexampled difficulty, who will go down to history. It can fairly be claimed for King George that he threw aside the last vestiges of mediæval monarchy and brought the greatest of British institutions into line with modern sentiment. He had a liberal mind in the finest sense of the term, and he made an adjustment of the relations between hereditary kingship and the democratic institutions over which he presided, which has made both infinitely stronger for the tasks they have to discharge in a changing world. His special qualities were not those of a commanding genius, but were an intuitive reaction to the special qualities of the normal Briton. Industry, common sense, courage, good humour, and a spirit of compromise were his in such a high degree that there seemed to emanate from him the perfect essence of the British temper.

In the realms of science, industry, and economics, the quarter of a century of King George's reign stands out as an era by itself. It has witnessed scientific and mechanical changes on a scale and at a rate which were wholly inconceivable when the King ascended the throne, with the result that at the end of the reign the products of industry and the common amenities of life available to the people as a whole, bear very little resemblance to the corresponding factors which existed in 1910. Against these historic advances in the comfort and convenience of life must be set the fact that the King's reign also witnessed a phenomenal growth of the political power which has reduced many of the countries of the world to ruin and altered the character of the daily life of the rest. King George and his people, almost alone among the peoples of the world, can claim some measure of success in the difficult task of carrying on with the practical work of life, whilst also conducting

widespread experiments in political ideas. King George V was the first occupant of the British throne in all the centuries of the monarchy's history to possess any real personal knowledge of the problems of industry, and the conditions under which it had to be carried on. As Prince of Wales, and later as King, he missed no opportunity of penetrating the practical side of the people's problems. It is perhaps to the personal knowledge acquired in that strenuous way that we must attribute the wise guidance which he has constantly been able to give to statesmen of all parties, who, because of their party limitations, were less able to see any particular problem from all sides.

In these latter respects the new King has not only followed in the wise footsteps of his father, but has trod this interesting road much more frequently and to far greater lengths. There are no previous records to approach the assiduity with which, as Prince of Wales, he mingled with his people, and all those special qualities of knowledge which ascended to the throne for the first time with his father now do so in a greatly amplified and extended form.

King Edward VIII assumes his tremendous responsibilities at an age which is generally accepted as finding a man at the height of his powers. A man in the early forties has a certain maturity of experience, and at the same time has not lost his freshness of outlook and the keen edge of his activity.

The last reign was marked by one of the most devastating catastrophes in history. The late King did more than any other single man to ameliorate the distresses caused by the Great War. The prayer of the Empire to-day is that the new Edwardian epoch that lies ahead will be one of peace abroad and growing contentment at home.

The people already feel that they know the new King almost as intimately as his father, and they confidently rely on him to act in the same spirit and to tread the same path to the glory of his Empire and the happiness of his people

Science Notes.

Assault on the Atom

An electro-magnet weighing 58 tons, formerly in use at the Annapolis U.S. naval wireless station, has been transferred to the physics laboratories at Columbia University in connection with a fresh attack that is to be delivered on the atom. The field of 14,000 to 15,000 gauss that can be created by this magnet is 75,000 times greater than that of the earth. Protons and deuterons are to be introduced into this magnetic field and directed under the accelerating chamber devised by Professor Lawrence, of California University. It is hoped that the maximum energy of 20 million volts that can be produced will enable the atoms of heavy elements, such as gold, silver, and lead to be disintegrated and that the creation of radioactive elements more powerful and much less costly than radium will be possible.

Alien Pests

A reminder of how an alien pest can spread, when once it has become acclimatised, is contained in the report from the United States of the progress of the Japanese Beetle (*Popillia japonica*). In a recent issue of *Nature* it is stated that this beetle, accidentally introduced into America in the larval stage in a shipment of Japanese iris in 1916, has now invaded the eastern coastal states, where it has become a destructive enemy of many kinds of trees and other plants. This is an interesting sidelight on the progress of British insect pests described elsewhere in this issue.

Control of Pests

The Ministry of Agriculture's report for 1935 is encouraging as regards the spread of the Colorado Beetle and the Musk Rat. No living beetle of this species was noted in 1935 (only one was found in 1934) and no musk rats were trapped between June and November, 1935 (as against five in Jan.-June), in the Shropshire district from which they first spread. It is difficult, of course, to prove a negative, but everything points to an effective control-system.

Ancient Libyans

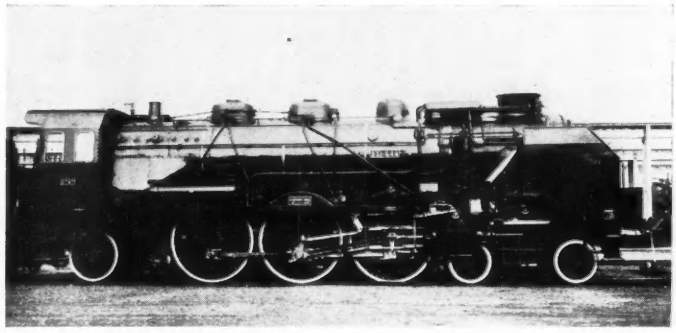
Mr. W. B. Kennedy Shaw reported to the Royal Geographical Society his discoveries in the Gilf Kebir, to-day a completely uninhabitable area of the Libyan Desert. A number of small caves or rock-shelters contained paintings, in red and white, of human figures and animals. Graves excavated in another site above the Wadi Hawa revealed skeletons, which proved, on anatomical examination, to be of predynastic type. Settlements of some size were indicated, to support which a very much rainier climate than that of the present day was essential, and it seems unlikely, on these grounds, that the remains can date from any later than 4500 B.C.

Ten Years of Locomotive Progress.

By Lord Monkswell.

In the midst of the publicity given to locomotives driven by heavy oil and by electricity, steam traction has been steadily advancing along the road of efficiency. As Lord Monkswell says, steam locomotives of ordinary design are "still without a serious rival for carrying on the work they have performed for more than a hundred years."

For something like a century, from the time when steam locomotives first ran on railways, hardly any serious attempt was made to evolve any method of inland transport that could compete with the railway or any machine for moving railway vehicles that could compete with the cylinder-and-piston steam locomotive. So far superior were both railway and locomotive to any rivals and so admirably did one suit the other.



Improved four-cylinder compound locomotive with poppet-valves and double blast-pipe. State Railways of France.

In these circumstances it must regretfully be recognised that, for a long time, technical development was of very slow growth once the locomotive and the railway had become established. There were, therefore, all sorts of improvements and developments crying to be made, and, during the last ten years, much more energy has been shown than at any time since the first years of the railway era. Among other things the steam locomotive has been enormously improved without change in the mechanical principles of its design. It may be interesting to give a short account of what has been accomplished.

The fundamental trouble with the steam locomotive has always been the small proportion of the energy produced by the combustion of fuel in the firebox that can be used for driving the engine itself and its train along the railway. Of the energy produced in this way the early engines probably turned into useful work not more than 2 per cent. In the years after the opening of the Stockton & Darlington Railway in 1825, the design of locomotives improved rapidly, and by 1850 the best engines may have returned 4 per cent. in useful work, or even 5. Then came a period of stagnation, which lasted for fifty years. Constant little improvements in design were of course made, and engines became bigger and heavier as the rails on which they ran became bigger and heavier also. But as regards ability to turn the energy of combustion into useful work the engines of 1900 were little superior to those of 1850. The power developed per ton-weight of the engine was about the same. Fifteen horse-power per ton-weight of engine was an unusual effort. The average was nearer ten. This question of power developed in relation to weight is, of course, of critical importance. The weight of an engine is limited by what the permanent-way can bear and, consequently, its efficiency varies directly as the effort it can exert per ton of its own weight.

From 1900 onwards various improvements were made tending to increase the efficiency of engines, and ten years ago a return of 7 per cent. in useful work was not unusual. At about this time workers in various parts of the world, particularly France, began a detailed study of how the steam locomotive could be further improved, and so successful were their efforts that it is now possible to design a machine that will return, in useful work, 10 per cent. of the energy set free by the combustion of fuel in the firebox, and can develop continuously for long periods 30 horse-power per ton of its own weight.

The power of a locomotive comes from the heat which is taken from the steam during its passage from the boiler to the atmosphere. To obtain the best results, therefore, steam must leave the boiler charged with the greatest possible amount of heat in the most utilisable form; the greatest possible proportion of this heat must be used for driving the pistons backwards and forwards in the cylinders and the least possible proportion dissipated in such ways as expansion without performing work, condensation in the cylinders, and back pressure upon the pistons. The first thing, therefore, is to

produce an abundant supply of steam highly charged with heat. The firebox being the part of the boiler which receives heat direct from the fire, the production of steam may be increased by arranging down the middle of the firebox a steel vessel with flat sides, through which there is an intense circulation of water from a point near the bottom of the boiler barrel to the roof of the firebox.

The higher the pressure of the steam in the boiler the greater the amount of heat it contains, but, as steam in the boiler is always in contact with water, it is always more or less wet. Wet steam is a good conductor of heat and, in its passage through the cylinders, large and very complicated exchanges of heat occur between the steam and the walls of the cylinders. The effect of these exchanges is, first, to condense part of the steam, and so diminish its pressure during admission and expansion, and then to re-evaporate the condensed steam, which causes it to exhaust charged with all the heat that it originally contained.

If the wet steam is led through pipes lying in enlarged boiler tubes, it first of all becomes perfectly dry, and then its temperature increases and it becomes superheated. Superheated steam is hotter than wet or saturated steam at the same pressure. Its volume is also greater. When steam has once become superheated further heat produces an increase in volume proportionally much greater than the amount of heat added. Superheated steam is a bad conductor of heat and, if highly enough superheated, it will expand in the cylinders without condensing, so that such interchanges of heat as take place between it and the walls of the cylinders are much smaller than is the case with wet steam and, consequently, less wasteful. Superheated steam is also a great deal more fluid than wet steam. So much is this the case that, though it has less expansive force than wet steam, it exhausts so much more easily that the effort which it develops during each stroke of the piston is very much the same, and the economy due to its greater volume persists. The temperature of the steam may be raised in the superheater to 800° F. without giving any trouble.

Steam-pipe and Valve Design.

To extract the greatest amount of power from the steam it is necessary to admit it into the cylinders at a pressure as near that of the boiler as possible. For this purpose, the regulator, main steam pipes, steam pipes in the superheater and valve chests must be made large, and sharp bends must, as far as possible, be avoided. The valves must also be large and of suitable design. If, owing to narrow and indirect steam passages, the flow of steam is obstructed sufficiently to reduce its pressure, there is loss of power. Some of the expansion that should be performed upon the piston occurs in the steam passages. The force of this expansion is lost and the only compensation is a slight increase of superheat in the steam.

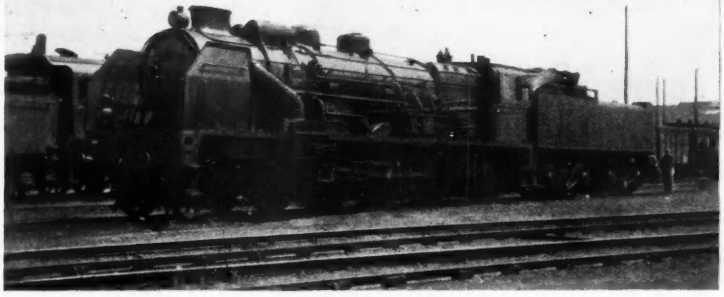
The valves may be piston valves or poppet valves. The former, if of the dimensions and designs ordinarily employed, do not give the steam all the freedom of movement necessary to produce the best results, but this drawback can be largely overcome by employing valves which give a double passage to the steam as it enters and leaves the cylinders. Piston valves are driven through ordinary valve-gears, and with these gears all the phases of steam distribution are interdependent; if steam is cut off early in the stroke of the piston the compression phase is too long and the back pressure consequently too high; the openings of the steam ports are also reduced and the flow of steam hampered.

The Poppet Valve.

With compound engines, in which steam undergoes expansion in both high-pressure and low-pressure cylinders, long or fairly long cut-offs are employed and the phases resulting from the use of ordinary valve-gears leave little to be desired. But with simple engines, in which the steam passes through only one set of cylinders and is cut off early, the compression phase of ordinary valve-gears is too long.

If poppet valves are used most of the disadvantages of piston valves can be overcome. The valves are placed at the ends of the cylinders, and very large and direct passages for the steam can be provided. The admission valve is completely separated from the exhaust valve, and each is driven through a separate cam. In compound engines where the phases of steam distribution given by ordinary valve-gears require little modification, the cams may be oscillated by such gears. This arrangement allows only slight changes of the phases to be made. In simple engines, where it is desired to work with a very short cut-off, the cams have to be driven by rotary gearing. That is to say, the cam-shaft, instead of oscillating backwards and forwards, has a revolving movement which is communicated to it from any suitable part of the engine. With rotary cams any desired combination of the phases of steam distribution may be effected.

With engines which can exert very high powers it is desirable, in order to distribute the stresses, to employ more than two cylinders driving more than one axle. Certain very high-speed engines have three cylinders, but if four are used the reciprocating masses can be made very nearly to balance each other, with consequent



Two typical French locomotives of the modern reconstructed type. On the right, Eastern Railway of France ; below, Paris - Orléans - Midi Railway.

diminution of stress, both in the engine and on the road, and without any tendency to roll, which is a trouble with three-cylinder designs. If four cylinders are used there are great advantages in making two of them high-pressure and two low-pressure. It has already been pointed out that the steam distribution is more favourable. In addition to this the range of temperature in each cylinder is less, steam leaking past the piston rings of the high-pressure cylinders still has to do work in the low-pressure cylinders, and the clearance spaces at the ends of the cylinders may be made large, which is conducive to easy running. The impossibility of exactly regulating the compression phase of steam distribution makes it desirable to keep as small as possible the amount (*i.e.*, pressure and volume) of steam on which the work of compression is done. In the low-pressure cylinders of a compound engine pressure does not rise above that in the receiver, and so economy is not sacrificed.

If there is any drop in pressure between exhaust from the high-pressure cylinders and admission to the low-pressure cylinders there is the loss of power which accompanies the expansion of steam without doing work. To prevent this, pressure in the low-pressure steam chest must be kept at a suitable level by means of a sufficiently short cut-off in the low-pressure cylinders. A short cut-off may, in turn, cause loss by excessive back-pressure, unless the valves are able to pass a large volume of steam very quickly. This the improved piston valves, and still more the poppet valves, can do. In these circumstances the power developed in the low-pressure cylinders is approximately equal to that developed in the high-pressure cylinders, which brings about a very even distribution of stresses. It is found desirable to make the low-pressure cylinders as large as can be got in, and it is therefore particularly important to reduce the back-pressure on the low-pressure pistons to the lowest possible point. This, in addition to large valves, involves the use of very large and direct exhaust pipes and a blast-pipe with a big orifice.

Till fairly recent times it was usual to give the blast-pipe a single orifice, through which the exhaust steam was turned into the chimney, without utilising to the full extent the power available. It has lately been recognised that by dividing up the steam jet a less violent and far more efficient draught may be created with less back-pressure in the cylinders.

A large number of designs has been tried, all of them based on the principle of breaking up the single jet so as to increase the surface of contact between the escaping steam and the smoke-box gases. Sometimes the section through which exhaust takes placed is fixed and invariable ; sometimes arrangements are introduced for varying the section and so increasing or diminishing the strength of the draught ; but in all cases the section is much bigger than with the old single jet, and back-pressure is greatly relieved.

As fully three-quarters of the heat developed in the firebox escapes through the chimney, there is no difficulty in diverting a small part of it to heat the feed-water.

Some of the exhaust steam is therefore often used for this purpose. It is led away from a point some distance below the orifice of the blast-pipe to a drum containing feed-water, which is then pumped into the boiler. The temperature of the feed-water may in this way actually be brought up to slightly more than atmospheric boiling point. Feed-water as hot as this cannot be driven into the boiler by an injector.

By suitable combinations of some of the features described certain engines running at the present time are, as already remarked, able to achieve an overall efficiency of 10 per cent. and to develop continuously an effort of well over 30 horse-power for each ton of their own weight. These machines are mostly, if not exclusively, to be found in France, particularly on the Paris-Orléans-Midi Railway, where much pioneer work has been done. So far no new engines have been built. They are all old engines drastically altered.

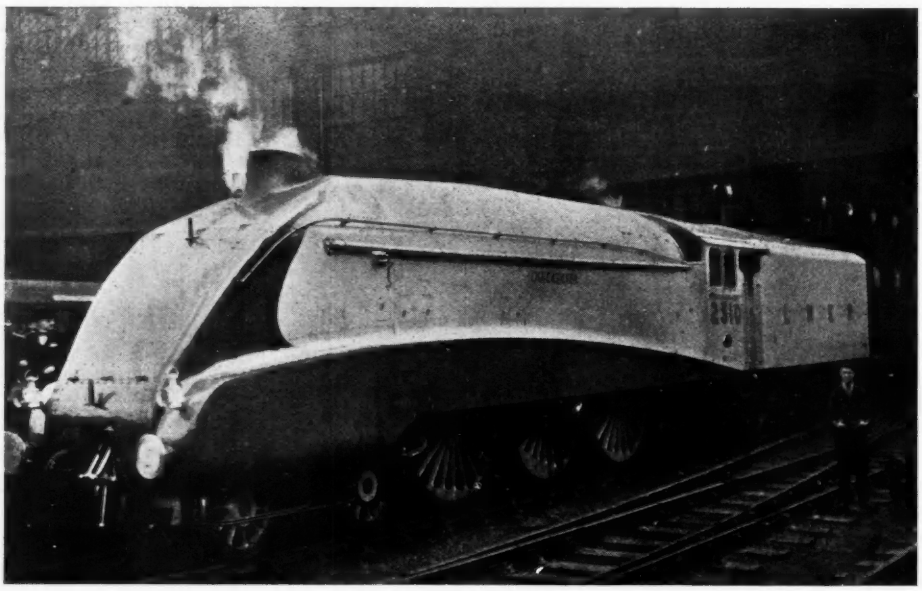
The problem of increasing the efficiency of the steam locomotive may also be approached by endeavouring to diminish the resistance to be overcome. The most noteworthy attempt in this direction so far made is that to diminish air-resistance by the streamlining of both engine and train. The matter is at present at a very early stage, and the difficulties are of the most formidable kind. The air-resistance encountered by the front of an engine is a very small matter compared with the resistance set up by a wind blowing against the side of a train, and the more is done to help engine and train to cleave still air or a head wind the greater is the surface against which a wind from the side must blow. The most that can be said is that it is probably right completely to cover in the gaps between the successive vehicles of the train instead of doing so partially by means of vestibules, as at present.

Experiments made in wind-tunnels are extremely unconvincing because trains do not run in wind-tunnels.

The engines described are fitted with boilers of the ordinary locomotive type. At the present time the highest pressure that can be used in boilers of this general design is about 350 lb. per sq. in. It is possible to construct boilers which will stand much higher pressures, but the design has to be radically altered. Such boilers usually have fireboxes consisting of nests of small tubes which are highly complicated and very difficult to clean. They have not got beyond the experimental stage.

Recently, certain attempts have been made to employ turbines as the driving mechanism in place of cylinders and pistons. This development also has not passed the experimental stage. A very serious objection to the turbines is that they involve the use of a large amount of complicated gearing, the complete absence of which is one of the chief advantages of locomotives of ordinary design.

As the efficiency of these latter machines is now some five times as great as it was at the beginning of the railway era it is not surprising to find that they are still without a serious rival for carrying on the work they have performed for more than a hundred years.



The streamlined locomotive "Quicksilver" of the L.N.E.R. in King's Cross Station, London.

[*Photo by A. J. M. Harris.*

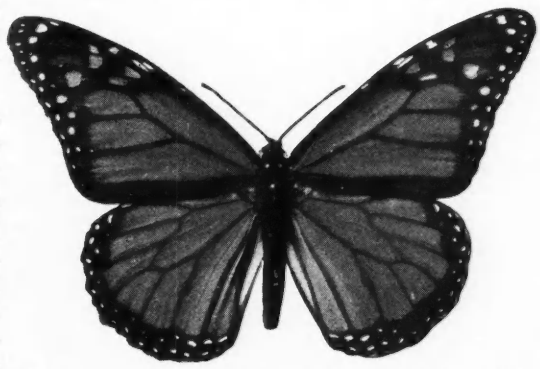
The Future of British Insects.

By Eric Hardy, F.Z.S.

The hold of the insect on life is tenacious; and the extermination of any one species is no easy matter. So it is not surprising to find that Mr. Hardy predicts no very fundamental changes in this branch of British fauna. Insects likely to disappear include the most noxious and some of the most attractive, for different reasons; and meanwhile we are fast acquiring new species, both good and evil.

INTERESTING, not to say intricate, changes are taking place amongst the numerous insects which are so distinctive a feature of the fauna of both town and country in Britain. Many of these are due to the arrival of alien pests, increasing thanks to the speedier and more extensive transport of modern commerce and to modern methods of building and agriculture; but the fluctuating numbers of some formerly scarce insects clearly indicate that the future of British insects is not entirely to be looked upon as a success for the insect pests.

Of the sixty-eight species of British butterflies, the Camberwell Beauty, Mezeron Blue, and Black-Veined White seem lost beyond recovery, and the Swallow-Tail and Large Tortoiseshell in East Anglia and the Large Copper in Devon hold very precarious positions; but in recent years such formerly scarce butterflies as the Comma, which has increased from its formerly restricted southern haunts as far north as Cheshire, Lancashire, and North Wales, and the White Admiral of the New Forest which annually seems more abundant in its increase in an easterly direction, raise hopes for a still interesting butterfly fauna in the countryside of the next generation. The increased planting of pine woods maintains the numbers of certain of the Skippers, while the large immigrations of the American Monarch or Black-Veined Brown across the Atlantic in recent years have exceeded all previous records.

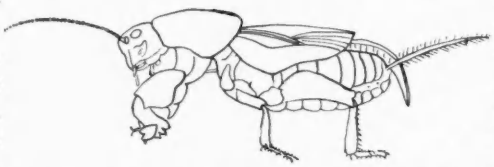


The American Monarch Butterfly, or Black-Veined Brown, which is immigrating in increasing numbers from across the Atlantic.

The curious if not gruesome Mole-Cricket has always been a scarce and retiring insect in this country, but the Field-Cricket, which was once quite common and familiar, is now on the verge of extinction and will probably be exterminated in a few years. Some enquiries among members of the British Empire Naturalists' Association the other year brought forth no recent records, though authorities on entomology had taken specimens in Sussex in 1899 and Hampshire in 1901; and Gilbert White in his *Natural History of Selborne* said a field near Selborne abounded with field-crickets. The house cricket too had become much scarcer until the recent hot summers and mild winters considerably increased its numbers. It seems much more numerous in the North than the South, probably owing to the many industrial townships and the fewer kitchen grates converted to the modern type which does not encourage the cricket. The changing styles of modern buildings do have a great effect on the insect fauna of human dwellings, and the increasing use of central heating is considered very likely to increase cockroaches unless special precautions are taken. The making of all roofs in the new Liverpool Cathedral (with the exception of part of the Lady Chapel) free of timber, and thus impervious to the Death-watch Beetle, is an example of how this insect may be reduced.

The Elm-Bark Beetle (*Eccoptogaster scolytus* Fab.) has increased remarkably in recent years and as it carries the fungus of elm disease, its increase is a serious economic problem of the future. It now occurs in Lancashire, Merioneth, Cornwall, and in nine counties north and east of London, but there is no definite report yet from Scotland. The Colorado Beetle has failed to establish itself in Britain despite the discovery of odd specimens at Liverpool and Tilbury, but its abundance in French potato-growing districts cannot be disregarded. The Mediterranean Flour Moth is now established in the principal flour-milling districts (e.g., Merseyside) and is increasing. In 1929 *Ephestia flutella*, formerly destructive to cacao beans and then to tobacco abroad, was found in London tobacco warehouses; it now causes £100,000 a year damage to British warehoused tobacco, so great has been its increase. Though bubonic plague is no longer a danger in Britain, the plague flea, contrary

to popular opinion, still persists at most of our ports on the black or ship-rat. A special investigation committee of the Liverpool School of Tropical Medicine showed that the plague flea, *Xenopsylla cheopsis*, occurred freely on ship-rats throughout the whole period of its investigations and a permanent breeding place of this species was found in certain city premises. A special flea, *Ceratophyllus wickhami*, has been found in large numbers on the alien Carolina grey squirrels, which themselves are on the increase in Buckinghamshire, while Oxfordshire grey squirrels have been found to act as host to at least three fleas, *Ceratophyllus sciurorum*, *Spilopsyllus cuniculi*, and *Ceratophyllus gallinae*, chiefly the first-named.

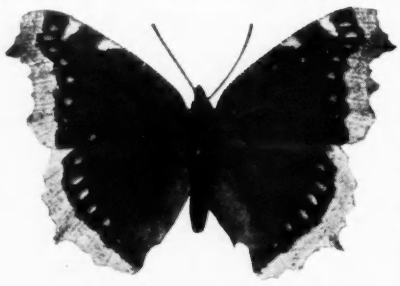


The ungainly mole-cricket is so scarce and retiring that it is difficult to estimate any changes in its numbers.

The draining of Lancashire and Norfolk marshes has done much to reduce the numbers of the 28 British species of mosquitoes, but in Cheshire, for instance, the permitting of extensive uncontrolled camping and of inferior-type bungalow-towns, especially in the Wirral peninsula, with inadequate drainage producing flooded conditions after rainfall, caused serious "plagues" of gnats in recent years. Changed industrial conditions and heavily polluted atmosphere in the North has this century produced the notorious dark or black variety of the Peppered Moth, which is increasing, and has been recorded from the Newcastle, Manchester, and Merseyside districts. The original Peppered Moth is white with black specks, but the form now common in the North of England is black with very little white, the original black parent, called *Doubledavaria*, having proved dominant to the paler form.

The Chrysanthemum Midge (*Diarthronomyra hypogæa*), an American insect causing serious damage, was first recorded in Britain in 1918 and 1920 from the wild ox-eye daisy in Devonshire, but it is steadily increasing. The Powder-Post or Lyctus beetles are menacing timber-yard pests but the Forestry Products Research Board is improving methods of prevention and control, while concern has been raised by the introduction from Northern Europe of the destructive timber pest beetle, *Hylotrupes bajulus* which attacks seasoned woods, chiefly in roofs, and seems to find English life encouraging. The persistent and costly wars by gardeners and farmers on aphides or greenfly, weevils and other pests only tend to keep these prolific insects in check and they are probably no less numerous now than 50 years ago, and will be no less numerous 50 years hence. Many of the weevils feeding on stored grain and cereals are certainly increasing, and recent exceptional weather conditions have probably increased the clegg-fly over much of its range. The Striped and Brassy Flea-Beetles have also been increasing in recent years, especially in the North-West as their damage to seedling greens indicates, but research by Dr. H. W. Miles of Manchester University and the Lancashire County Council has shown some effective napthalene-silica dust treatments for checking them. Despite one or two serious outbreaks in recent years, such as that in North Wales in 1934, the Cockchafer does not seem quite so numerous as in pre-War years, but that may be due merely to a temporary cycle.

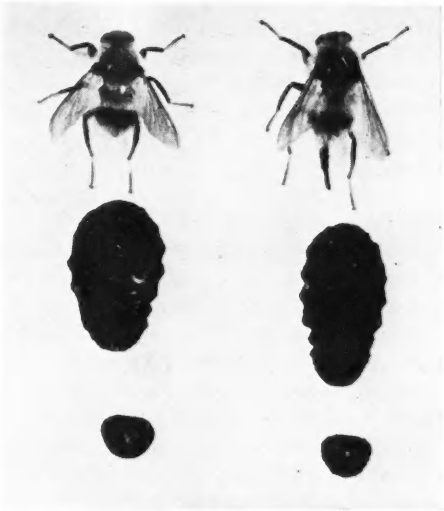
The Ministry of Agriculture took action in 1932 against the danger of the introduction and spreading of the Cherry Fruit Fly from France and other Continental centres where it is most destructive. Extensive planting of conifers since the War has raised the problem of undue increase of the damaging Pine Weevils, but the special precautions taken in advance seem to have prevented such danger. Serious outbreaks of various species of insect pests occur locally from time to time but these cannot be taken as any indication of general increasing numbers for the future. The improved methods of treatment may, however, act to their general decrease. The successful derris treatments for Warble Fly damage perfected by North Wales farm trials under the agricultural department of Bangor University, 1930-31; and the ortho-dichlorbenzene treatment of Leather-jackets perfected by the Green-keepers' Research Station at Bradford, are examples, though whether the paradichlorbenzene and di-chlorethane treatments for Clothes Moths, proved so successful by the British Wool Industries Research Association at Leeds, will make any appreciable reduction in the number of these small moths, it would be premature to state. The modern winter tar-distillate wash or spray for fruit trees instead of the old-fashioned and very ineffective method of



The Camberwell Beauty. It is probable that the original native species is extinct and that those now found in England are specimens introduced from abroad.

whitening the trunk with lime will, when generally adopted by rural gardeners, considerably reduce the numbers of Codlin Moths, Winter Moths, Umber Moths and other fruit-tree pests of to-day. The once typical old English black bee seems generally dying out, but that is probably more a matter of bee-keeping than natural change.

It is common knowledge to most trout-fishers that the May Fly has steadily decreased over many parts of the country in recent years, largely due to the increasing pollution of fresh waters, especially in the North, though on northern streams the Stone Fly and Alder Fly are more numerous, among aquatic insects forming fish food, than the May Fly. The future may see the May Fly so reduced that the annual waiting for its appearance will become a purely local event. The Glow Worm does not seem so familiar an insect as it used to be, and no doubt finds the urbanisation of the countryside hostile to its mode of life. Where there has been little development of rural North Wales, the Glow Worm is still as numerous as 50 years ago, but in west Cheshire, which has changed from a rural area to an almost completely urbanised peninsula, this little beetle, formerly tolerably numerous, has now but one known haunt. The large nests of the Field Ants are another vanishing feature of the countryside, and the Mason Wasp is much less frequently recorded at work than it used to be, though this decrease may be but slight.



The Warble Fly, a cattle pest that is yielding to systematic treatment. The male (left) and female (right) are here shown above the pupa-cases, with the tops forced off when the flies emerged.

Alien Pests.

Mr. H. Britten, F.R.E.S., of the Lancashire and Cheshire Fauna Committee, has recorded considerable numbers of alien insects, such as cockroaches, etc., imported accidentally to Liverpool and Manchester in fruit and other goods where they had sought shelter, but like the majority of the many alien plants introduced to these great shipping centres, they fail to establish themselves: the danger from alien insects is not so much the mere introduction, as the finding of sufficient food and suitable climate. Even many of the costly and increasing insect pests to stored goods do not penetrate far from the ports and warehouses. The most successful colonists are those whose natural food is abundant or who can readily adapt themselves or their diet to changing conditions. The Woolly Aphis which causes American blight and was introduced to Britain about 1776, now inhabits almost every orchard and is securely established.

The variation of the numbers of insects in the future has an importance quite apart from the question of insect pests. The sawflies and probably other insects using timber in their life-history have been proved in this country to act as agents distributing timber-destroying fungus-spores, the destructive fungus *Stereum cyaneus* being carried, for example, on the ovipositors of various Siricidæ, while the Elm-bark Beetle transports the fungus of elm disease. Plant-pests vary largely according to the varying popularity of certain plants and tend to increase with the increasing number of allotments, which have multiplied so much in the North in recent years and tend to increase further. On any given allotment plot as many as 200 separate workers may have their holdings, and as each treats his insect pests independently or not at all, even two or three neglected holdings amongst a number will affect widespread areas with insect pests, as I have found through my own garden adjoining a section of allotments. Farms on the other hand have less variety of plants and relatively fewer insects. The increase of market gardens and smallholdings, as in Cheshire, does not seriously increase insect pests as the owners of these, working full-time as against the allotment holders' evenings and week-ends, pay far more attention to insect control. The increase of greenhouse insect pests in recent years is no doubt due more to amateur greenhouse-owners growing flowers for themselves and taking scant precautions, if any, against pests, than to the commercial grower who realises that active suppression of insect life increases his financial return.

The increased and usually compulsory fumigation of ships in our ports as at Liverpool, has not only con-

siderably reduced the rodent population of the vessels and the docks, but also the insect fauna. The American Cockroach (*Periplaneta americana L.*) was, just over twelve years ago when ship fumigation was less thorough than to-day, a very abundant and familiar insect on North Atlantic liners, and in and around the docks and warehouses at the ports, but in recent years I have found it far less numerous. I can remember the days when hardly a sailor could open his bag or chest of clothes after making port at Liverpool without finding one of these insects in his clothes, though nearly every man had a different name for it. Fortunately the corn laws, which call for the destruction by farmers of all ragwort, thistle, and dock on their land annually are not strictly adhered to, and so the diurnal Cinnabar Moth, whose food-plant is the first-named, is still quite numerous, despite suggestions to the contrary. An abundance of the food-plant is not alone an assurance for the future of an insect, of course, for while we have plenty of wild convolvulus climbing over hedgerows, the Convolvulus Hawk Moth, whose caterpillar feeds on this "bindweed," is, as ever, one of our rarest moths, relying on a few immigrants for its survival as a British species. The Death's-Head Hawk Moth also relies largely on immigrants from the Continent to maintain its status, and the great potato-growing area of mid-Lancashire does not seem to have any more of its larvæ found than other districts. On the other hand, the increasing farming of asparagus on the sandy West Lancashire dunes around Formby has considerably increased the numbers of Asparagus Beetles, despite the rearing of partridges and pheasants on the farms to keep down these pests. The increase of bulb farming in Lincolnshire in the last twenty years is no doubt responsible for the frequency of the reports to the Midland Agricultural College of bulb-eating insects, like *Anuraphis tulipae*, damaging roots of carrots and parsnips in Nottinghamshire, Derbyshire, Leicestershire, and Lindsey. The legal insistence on insect control is lax or non-existent until there is an actual outbreak of some pest causing serious financial loss; then legislation often comes too late to eradicate the pest from among the fauna of the country.

Upsetting Records.

Most scientific natural history bodies strongly oppose the introduction and liberation of Continental specimens of rare or extinct insects—which has occurred frequently with the butterflies—so upsetting scientific recording, even when the liberation is recorded. Camberwell Beauty, Swallow-Tail, Large Tortoiseshell, and other butterfly records have all been discountenanced through such introductions.

Correspondence.

A CALL TO THE ANCIENT WORLD.

To the Editor of DISCOVERY.

Sir,—The review, published in the January issue of DISCOVERY, of Dr. Glover's latest book* draws deserved attention to the admirable qualities of the work. With one serious qualification this book is probably the best small companion to the classics now extant, to ease the teacher's task. It is written for the most part in an attractive colloquial style and is full both of the interesting side-lights which most of us asked for in vain as we toiled through our Cæsar, and also of many enlightening comparisons between New and Old.

But let us turn to the aspect of the book on which it appears so strangely deficient. Dr. Glover includes a charming defence of Cicero, mainly from the personal and literary point of view; Cicero was, as Dr. Glover says, the channel by which classical Latin reached the mediæval world, and hence the model of modern prose. But he was much more than that, and the other and deeper side of him, which is hardly touched on by Dr. Glover, derives from sources which are entirely ignored in this book. Cicero is, above all, the product of centuries of hard thinking, reflected at last in the mind of a very receptive and sensitive person who was no original thinker himself, but too intelligent to miss the profound importance of what Greek science and philosophy had done for the human mind. Dr. Glover gives us the moral stimulus which Cicero's *Hortensius* passed on to St. Augustine. He says nothing, either here or anywhere else in the book, of the solid constructive work which generations of Greeks had done in building up the fabric of human thought. Cicero does. As commissioner in Sicily he searched out the tomb of Archimedes and found it at last all overgrown with brambles. He cleared the cylinder and the sphere—the symbols of Archimedes' crowning theorem—and restored to Syracuse the memory of her greatest citizen, which, says he, but for a man from Arpinum they might have lost for ever. Strange, that, after all these centuries in which science has made such prodigious strides and transformed the world, Oxford and Cambridge should still need the labours of another man from Arpinum! Neither Pythagoras nor Hippocrates, Hipparchus nor Archimedes—a few of the greatest names in the immortal roll of Greek genius—occurs in this book. Yet it professes to be an introduction to the study of the ancient world as a whole and what it means to us. It ignores quite rightly the details of battles and constitutions and all matters of minor significance in the march of events! But, alas! it ignores also the weightiest matter of all, the strongest power by which Greece and her foundations are built below the tide of war. From these, "her citizens, imperial spirits, rule the present from the past!"

Yours faithfully,
F. S. MARVIN.

Welwyn Garden City, Herts.

A special memorial Exhibition at the Science Museum, South Kensington, open until April 19th, 1936, commemorates the bi-centenary of the birth at Greenock, on January 19th, 1736, of James Watt, engineer and inventor.

**The Ancient World.* By T. R. Glover (Cambridge University Press. 7s. 6d.)

Naturalists in the Prokletija.

By F. S. Copeland.

Lecturer in English at Ljubljana University.

Mrs. Copeland is well known to readers of DISCOVERY *for her racy descriptions of the wonders to be found in the less frequented parts of Yugoslavia. Here she gives us the record of her journeys in the wildest part of that country—not yet a tourist resort like the Dalmatian coast.*

FROM a week's mountaineering in the Yugoslav Prokletija Mountains on the Albanian frontier in 1933 I returned with my ideas about that part of the world badly upset. From the cragsman's point of view, the tour had been disappointing. There are no great walls to tempt the climber—but who would have expected such a rich and varied flora in a range whose very name spells desolation—*Prokletija*, the Accursed? I am no botanist but I saw at a glance that the flowers of these mountains differed from those of the eastern outliers of the Alps, and also from those of the Kras (Karst, Carso) and the Dalmatian littoral. I collected a few specimens at random; but all I could learn about them later on was that no expert report upon the flora of this particular region had yet appeared. The Balkan botanist Košanin had been all over it, but died before his notes could be published. Nine years ago these mountains were still notoriously unsafe; even now, scrambling about with a primitive Balkan village for headquarters would not appeal to everybody. So I decided to do the best I could by myself, to explore the Prokletija again in 1934, with camera and sketch-book, to collect a representative lot of flowers, submit them to the best expert I could find, and see what would come of it. I was not at all diffident about going to South Yugoslavia alone on my flower hunt. All the same, I was glad of an enthusiastic companion in Professor Lj. Kuščer, an all-round naturalist who specialises in snails and is a recognised authority on the subject.

Arnauts and Montenegrins.

The natural centre for the Yugoslav Prokletija is Gusinje, a small town, 3,000 feet up, at the junction of several valleys near the source of the Vruja, a fine limestone torrent bursting full-grown from the rock. Below Gusinje, this river is called Luča until it enters Lake Plav further down. From the lake it emerges as the Lim. At Gusinje I was welcomed like an old friend, and the Professor and I spent the evening sipping black coffees with the Captain of the frontier guards and the Sergeant of police at the most frequented coffee house on the market place. Around us was the ramshackle homeliness of an Albanian frontier village. Grave Arnaut mountaineers, picturesque and tattered, went by, trim frontier guards and sturdy policemen; slatternly women in baggy trousers, with "veils" of checked linen drawn about them like an Indian woman's *sari*; haughty Montenegrins with little round caps, and Montenegrin dames, puritanical in black, with black head-kerchiefs. The mountains round Gusinje, on the Yugoslav side of the frontier, are scarcely more than outliers of the great Prokletija Range. Within a fortnight I went over all of them, except Čokište, which looks as it if were more of a mountaineer's job. I made six ascents in all.

Violas and Primulas.

During my visit at the end of June, 1933, I was struck by the great profusion and sturdy development of a handsome viola (*Viola elegantula*). At 3,000 to 4,000 feet, the flowers were tri-coloured; as we went higher, yellow began to predominate. A meadow on Mount Belić, at an altitude of about 6,000 feet, was a carpet of yellow violas, with tall primulas springing up between them. The primulas were in full flower and the most beautiful I have ever seen growing wild. The flowers resembled those of the oxlip (*Primula elatior*) in shape and arrangement, but they were larger, deep golden-yellow, and exquisitely fragrant. The leaves were remarkably "felty" on the under-side. We found similar carpets of violas on Čakor Pass, but there the flowers were all mauve. I was told, later on, by an experienced mining engineer, that a prevalence of violas is often associated with the presence of lead in the ground; but not necessarily. I need not think that there were bound to be valuable lead deposits underneath my viola meadows!

In 1934 I reached the Prokletija a fortnight later in the season and the flora was in a different stage. *Viola elegantula* was practically over. In the hedges gleamed the velvety crimson of *Lychnis coronaria*, an old friend in Scottish gardens. Campanulas of several kinds were much in evidence, both in forest and meadow. I recognised our big *C. perseicifolia*; other kinds looked familiar. There were two kinds of wild roses—one deep red, like *Rosa alpina*, but not thornless; far from it! The other was creamy white, almost the shade of a tea-rose. In a meadow I found outsizes in *Orchis*

globosa, red pinks (not identified), campanulas, and a wealth of dog-daisies and other old friends. In a clearing, at about 5,700 feet, I first saw *Linum capitatum* in bloom—green leafy stalks topped with a spreading crown of golden yellow flowers. In that clearing there was also a hut, a most primitive construction of logs and branches, with smoke coming out at the top—just the right sort of cabin for a witch in a fairy tale. As I looked again, it seemed to me that fancy had suddenly become fact. Beside the cabin stood three girls. They did not fit into the picture. I know of no picture into which they could have fitted, save a Scandinavian troll forest. They were robustly handsome ; unveiled, with great provoking hazel eyes, wide smiling lips, and strong white teeth. Their heavy jet-black hair was bobbed, an ebony frame about their faces under kerchiefs worn far back upon the head. And their dresses ! Over a white blouse a slip of black cloth, fitting sheath-like to the hips and then spreading in great flutes about the knees, the fluted part being cunningly shaped out of strips of cloth fitted together and starred with specks of metallic bead embroidery. Ear-rings and coin chains completed this remarkable costume. As a matter of fact, the girls were only " Katolike," i.e., Albanian Roman Catholics, in their habitual finery. The bobbed hair showed them to be married women. I learned later on that sometimes good Moslem women from Skutari also wear this dress, despite of the want of a veil.

Above the clearing was a great outcrop of limestone rock where I found old friends and new among the flowers. Will you please take *Cerastium alpinum* and *Alyssum* (*transsilvanicum*) for granted everywhere at suitable altitudes, providing a groundwork of gold and white on grey and green? I renewed acquaintance with the dull red flowering *Saxifraga Ferdinandii Coburgi* which had delighted us the year before on Belic ; but here there was no sign of the exquisite maroon and yellow *Fritillaria tenella*, which had then kept it company. But there was a dwarf campanula (*alpina ?*), and great bushes of the white *Daphne alpina* were most beautifully in flower.

Daphne alpina.

A fantastic ridge of limestone turrets, cutting abruptly across the grassy hillside, looked as if it had been lifted bodily out of the Eastern Alps. There I found tall mountain pinks of deep crimson, single-flowering (not identified). *Armeria canescens* looked like our Alpine thrift gone anaemic in the heat. Commoner saxifrages (*altissima* and *incrustata*) flourished. From pockets of rich soil rose magnificent ancient pines, storm-battered and stunted in height, but not in girth—survivors of the primeval forest. That night I spent in a guardhouse on the Popadija Planina, 5,500 feet up.

I woke up next day to the dewy freshness of an Alpine morning. On the doorstep were two Arnaut children who had come from a settlement further down to beg

Gentiana Kochiana.

for sugar. A year before they would not have been so confiding. Soldiers are notoriously fond of children ; and in so far as the Frontier Guards are employed in pacifying the hill people who have never before in history known what it is to live under a settled civil order, this quality plays a part not to be despised. That summer's day the Popadija Planina was an idyll of peace. The turf was gay with *Linum capitatum* and the tiny *Phyteuma obtusifolium* (Freyn). *Gentiana tergestina* took the place of our *verna*. Above us, Trojan Pass was spanned by a great natural archway, battlemented with pines.

From about 5,900 feet upward I found *Gentiana Kochiana* (Perr. et Song.), grandest of the large flowering gentians. The great corolla is intensely blue with a suggestion of crimson light within, and the flower is borne up on a stalk of at least 1½ to 2½ inches. On marl I came across *Astragalus fialae* (also classified as *Oxytropis dinarica*), associated with *Onobrychis scardica* (Hal.)—a charming combination of cream and crimson. The corrie leading down to Vojuša Valley is interesting by its sharp division into a limestone side and a non-limestone side, the latter characterised by a surface

Mountainous country characteristic of the Yugoslav Prokletija. On the right, a Katolika, a woman with the strongly handsome features and the style of hairdressing typical of the Albanian Catholic inhabitants of the region.

stream rising near Trojan Pass. On returning to the forest belt I found plenty of *Digitalis ambigua*, *Linaria vulgaris*, and a martagon lily in bud. The remarkable thing about all these flowers was their great size.

A *karaula* (guardhouse) stands on a terrace at the foot of Vojuša valley-head below Volušnica crag, which is pitted with caves. I am sorry now that I did not clamber up to prospect for flowers and snails. Below the terrace was a lush water meadow, locally famous for flowers, not so much rare as effective. *Asphodelus albus* (Mill.) grew rank (it is common in patches up to about 4,500 feet) setting off the blue and purple heads of *Muscari comosum* (Beck). Short turf was spangled with potentillas (one of them classified as *laciniata*) and helianthemums; the air was perfumed with specially fragrant thyme (*Thymus albanus*). Orchids flourished in damp spots.

At Gusinje I found the professor engaged in enlisting the services of all and sundry, the military and police included, in his search for snails. My return put an end to what will doubtless be remembered as a golden interlude by some of the idlest ragamuffins in Gusinje. To prevent a shameless exploitation of my colleague I promised to collect snails for him myself wherever I went—as many as he could possibly carry away, of all sorts, and of as many kinds as I could distinguish.

I ascended Belić twice with a soldier as companion, each time crossing the entire massif, a long trek and a thirsty one in hot weather. Near an Arnaut settlement on the largest pasture of the Belić Planina I dug up several good plants of the primula that had so impressed me the year before. They have done well in the Botanical Garden of Ljubljana and even flowered. The gardener-botanist tells me that they seem to him a sort of cross between *elatior* and *columnae*, perhaps evolved locally in the comparative seclusion of Belić. Dr. Turrill, of Kew Gardens, identified the plant as *Primula columnae* (Ten.). On the ridge facing Maja Rosit I saw *Edraianthus* for the first time, growing profusely in all its beauty. The flowers are almost as large as those of *Gentiana Clusii*, and pale violet blue. Dr. Turrill identified several varieties in the specimens I submitted to him. Every crack and fissure in the summit rocks was stuffed with these flowers, set upright in cushions of discreetly sage-green leaves. In one kind the leaf is fine as grass (*Edraianthus graminifolius*) and in all kinds inconspicuous. On patches of turf grew vigorous plants of a very large-flowering yellow viola (*Viola gracilis* S. et S.). There were also plenty of snails on Belić; in fact, the summit seemed to be largely composed of dead shells, which are, fortunately, almost as interesting as the live creatures, and far more pleasant to collect. On loamy soil on the western slopes of Belic I found groups of enormous plants of *Gentiana lutea* in flower. The root of this gentian is highly prized for its tonic properties, and by treating it with native brandy they make an excellent bitter of it thereabouts. Associated with this gorgeous gentian throve *Veratrum album* in disgusting profusion—a snob of a flower that pretends to be something superior till the spikes of mean little white-and-green flowerets give it away. Equally ubiquitous, but much handsomer, is *Verbascum*, in two varieties, one very large-flowering, with a single spike, the other branching, and smaller both in leaf and flower. From 6,800 feet there were *Semperviva* (one identified as *Košanini*), splendidly flowering in red, yellow, and white.

It was on Belić, by the way, that an unfortunate

naturalist was murdered by the hillmen as recently as 1926. Now the mountains are perfectly safe, especially if people know you and if you are escorted by a soldier. Ten years ago one soldier alone was not safe. The defile of Rugove Klisure bore an evil reputation for bandits. Now the bandits are no more. Some were killed in affrays with the police; others, adapting themselves to modern conditions, have taken to respectable ways. One should never forget, down there, that up to the end of the Great War and the advent of the Yugoslav régime, fighting was deemed the only occupation worthy of a man, among Montenegrins and Arnauts alike. Even now, the tradition of the men of the country is told by their sensitive, aristocratic hands, and the graceful alertness of their manner.

5/1

Jaminia macedonica procheuma, *a snail hitherto found only on the Adriatic littoral. The author's discovery of it in the Prokletija proves that it is carried shorewards by underground rivers.*

By far the finest mountain for flowers is Bor, and I was more than grateful to the soldiers who put me up twice at their karaula, and insisted on feeding me into the bargain. On Bor I saw *Wulfenia carinthiaca* for the first time; tasselled spikes of beautiful deep blue flowers topped by buds of purply red rose from turf that was crowded with other lovely alpines; also great plants of *Gentiana Kochiana*, sometimes with as many as eight large blooms veering towards the sun. *Geum montanum* was still in flower, rather like a yellow-flowering strawberry on a tall stalk, and *Viola gracilis*, deep lemon-coloured, large as a garden viola.

Dianthus tristis was just beginning to flower. Its cluster of small crimson blossoms is almost globular. Here, too, I found *Lilium albanicum* (classified by Dr. Turrill as *Lilium carniolicum* Bernh.). It certainly grows like the Carniolan lily, but is rather more sturdy, and the flowers are lemon-yellow, shaded black towards the interior, and with terracotta anthers. There was also the pretty dwarf *Genista Czikii* (Kümm.) with a wealth of yellow flowerets.

The most interesting trip from a mountaineering point of view was the long and strenuous day I spent on the ridge from Kodranikče to Vezirova Brada. My escort on that occasion was Dino Vanbrač, a wiry little Serbian soldier and a good mountaineer. We began by scrambling up the couloir, keeping to the rocky outer edge. In the woods below I found an enormously tall white scabious, edraianthus on the rocks, and in the cracks plenty of ferns. In deep grass above the couloir grew enough *Nigritella nigra* (vanilla orchid) to satisfy even the most confirmed floricide among week-end Alpine climbers. Large anchusas were beginning to flower (*Anchusa Barrelierii*), huge polygala, and I don't know what else. My eyes refused to take in any more flowers. I rejoiced in the climb, negotiated a chimney or two in style, greatly to Dino's admiration, and collected snails, little pointed ones, for the professor. A soldier always appreciates a change from routine. Dino threw himself wholeheartedly into the snail-collecting business, until I had visions of his crashing and breaking his neck. And what would become of me then? So I pocketed a few more picked specimens to finish up with, among them a little, round-ended fellow, just to show that he, too, existed up there.

Towards dusk, Dino and I strolled down, back to Gusinje. My last climb in the Prokletija was over for this season. When I arrived at our hotel (i.e., Marko's coffee-house on Gusinje market-place) I found that Professor Kuščer had already started back for Peć. Would I collect and bring his snails, boots, and a few other things? The only part of his baggage that needed collecting was the snails. Those big *Helix vladika* are capable of concerted action. *Viribus unitis* they had forced the lids of their boxes and were careering all over the room in search of freedom. Never speak to me again about a snail's pace except with reference to a Marathon runner or a racing car! By the time I had stowed one wallful back in its box, another squadron had gained the ceiling or found refuge in the bedclothes.

A Mystery Solved.

Professor Kuščer got good material out of those brutes. There are, in the main, two kinds of large land snails on the limestone part of the Prokletija: *Helix vladika* and *Helix Kolašinensis*. The little pointed snails were less characteristic. But the stumpy one proved a great find. Hitherto it had been picked up only on the Adriatic coast, washed up by waters whose course is mostly underground. The place of its origin had been a mystery which my specimen has gone far to solve. The snail is at home on the heights, about 6,000 to 6,500 feet. Its full name is *Jaminia macedonica procheuma*. It is a pretty little thing.

Some day, not too far distant, I hope to return to the Prokletija, with a reliable camera, and, it may be, an expert botanist for company, to collect more flowers, and stones, and perhaps even snails—but not live ones—never again! Why do I not mention insupportable heat, mosquitoes, fleas, and other minor troubles? Because I failed to experience them. Normally, there is nothing wrong with the climate of the Prokletija until the second week in July—that much I can vouch for.

Pilsudski and Poland.

By R. B. Mowat, D.Litt.

Professor of History in the University of Bristol.

With the death of Pilsudski and Masaryk, the two great republics in "new" Central Europe have lost their leaders. How Pilsudski worked for the re-birth of Poland, and how he held the state together when it was re-born, is Professor Mowat's theme. That the "dictator," though full of determination to secure his country's weal, should have been personally so modest and unaggressive, will come as a revelation to many readers.

GEOGRAPHERS and writers on public affairs on the Continent frequently use the phrase "the New Europe" as distinct from the Europe before 1918. From the political point of view something like a new face has been put upon Europe since 1918, through the emergence of new or restored states (six in all) and the radical transformation of the frontiers of many other states. A Secretary of State for Foreign Affairs or a diplomat of the period before 1914 would, if he came back to-day, simply not recognise Central Europe. The political face has completely altered. Only the imperishable works of Nature have remained the same, or at any rate substantially the same; for there has been a certain amount of "land-planning," though not on the scale undertaken in the United States, as described in Dr. Stamp's article in DISCOVERY last August.

Joseph Pilsudski: woodcut by Stefan Mrozewski from the death-mask.

[From Patterson's "Pilsudski," by courtesy of Messrs. Arrowsmith.

Poland, the largest in area of the new or restored republics, was an ancient state, partitioned in 1772 and 1793, and suppressed completely in 1795. The territory of the state was made over in portions of various sizes to Russia, Austria, and Prussia. As the state never had possessed geographical frontiers plainly marked out by Nature, there was nothing in the 19th century to mark where Poland had been. It existed only in the minds and hearts of the Poles, who were Russian, Austrian, or Prussian subjects.

That the idea of a living Poland endured through the years of suppression from 1795 to 1918 is a proof of the cohesiveness of the Polish people and of the strength of the national sentiment. The idea was kept fresh in the people's mind by language, by tradition, and by the development of economic groups of Poles in co-operative societies and similar lawful bodies. Perhaps in some distant and enlightened future the Russian, Austrian, and Prussian states might each have peacefully resigned their portions of formerly Polish territory so as to reconstitute the Polish republic. It was the collapse of these three Empires towards the end of the World War which made possible the restoration of Poland in 1918. Although this is a simple explanation, yet in practice the creation or restoration of a large state is a difficult matter to accomplish, and the circumstances generally remain obscure for years. A good deal of light has been thrown on the origin of the new Poland by a recent work about Pilsudski, which in certain respects may be compared with Dr. Benes' account of

the making of Czechoslovakia.* *Pilsudski* is the result of personal investigations made in Poland by the author of the book and is a modest but useful contribution to knowledge of an obscure subject. Joseph Pilsudski, who died on May 12, 1935, was born December 5, 1867, at Zulow, under Russian rule in the former Grand Duchy of Lithuania. The Lithuanians, though now ruling themselves as one of the new states of Europe, were before 1795 united with the Poles in the state of Poland. Pilsudski's parents owned the estate of Zulow and were able to give their ten children as good an education as was possible for a Polish patriot in Russia. When he was seven years old, the family moved to Vilna and Pilsudski was sent to school at the *Gymnasium* of the city. The education provided by the Russian authorities was, within its limits, of a high standard, but it was entirely subordinated to the policy of "Russification" uncompromisingly adopted since the suppression of the Polish rebellion in 1863. The teachers, the language of instruction, and the history taught in the school were Russian. It cannot be said with certainty that an official policy of 'assimilation' always fails, but it is certain that it was a failure as practised upon the Poles. The young Pilsudski reacted against it consistently; his whole mental and moral outlook was affected by it. "I suffered all the time I was at the Gymnasium," he once said, "and a long time afterwards my nightmares took the form of a Russian Professor." His private reading was largely concentrated upon the French Revolution and Napoleon. In 1885 he entered the University of Kharkov as a student of medicine, but was expelled next year on account of his political activity. He returned to Vilna and formed a society, secret naturally, of young Polish patriots, but he was sought out by the police and sentenced in 1887 to five years in Siberia on a charge of participation in a plot to assassinate the Tsar Alexander III. Pilsudski is believed to have been innocent of the accusation and to have been always against the atrocious policy of assassination. It was on a charge of participation in this conspiracy that the elder brother of Lenin was sentenced to death. Life for the exiles in Siberia was not exactly prison life, but was rather that of a penal settlement. The convicts had considerable freedom of movement, and could associate together for work and for recreation. Most of them were Socialists. Indeed, any sort of opposition to the Tsarist Government was apt to take the form of Socialism, and in this respect Pilsudski was like the rest of the exiles; but his Socialism was only a means to a political end—the freedom of Poland. In 1892, his sentence duly served, he came back to Vilna and resumed his conspiratorial career.

Pilsudski as brigadier-general with officers and men of the 5th Infantry Regiment of the Polish Legions (1915).

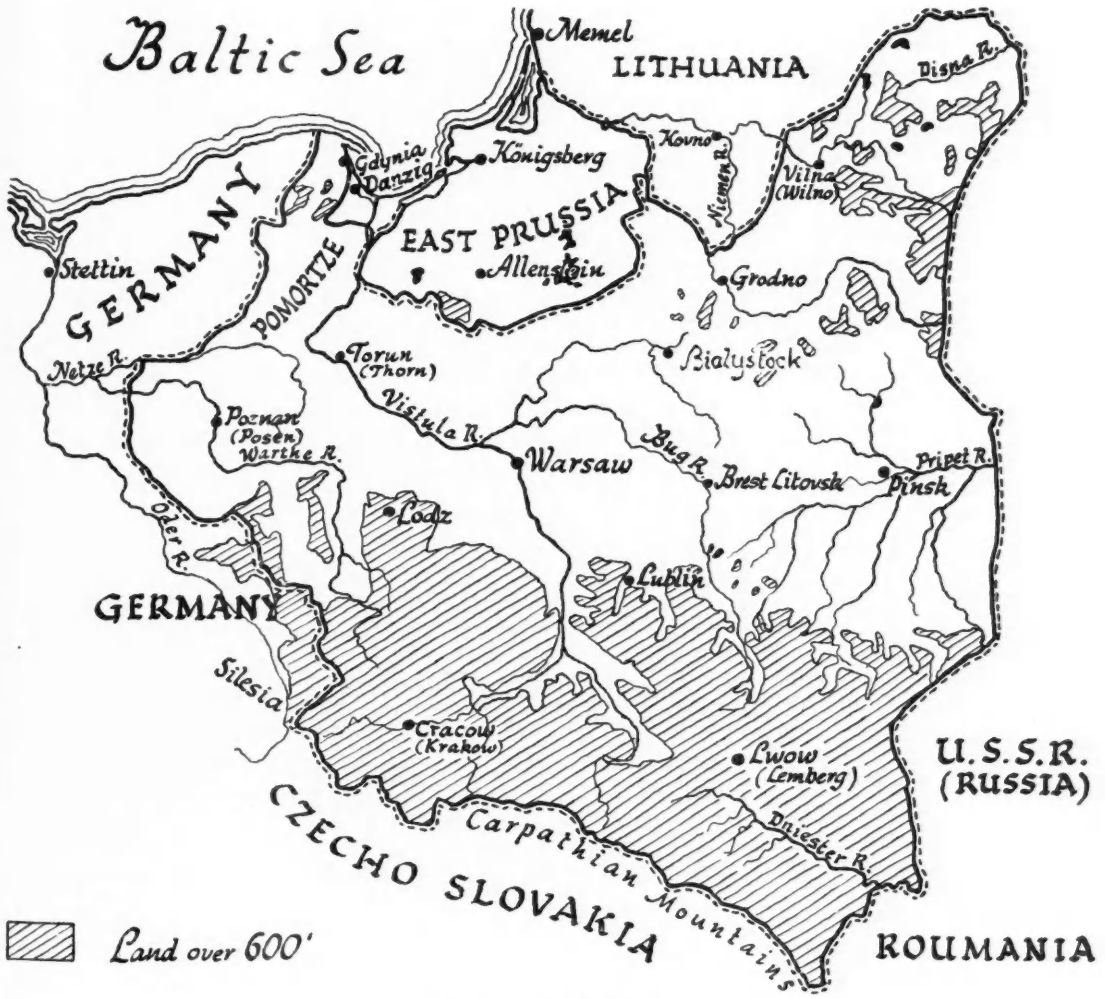
[*From Patterson's "Pilsudski," by courtesy of Messrs. Arrowsmith*

A Polish Socialist party had recently been formed, and Pilsudski now joined it. His aim, however, seems to have been wholly political and nationalist. "No class," he once said, "is able to carry through a victorious insurrection against an oppressor. It must be the work of the whole nation." Equally realistically he declared: "No one will consent to die for an increase of a penny per day in wages." Pilsudski's organisation was not cosmopolitan nor Marxian, but it extended from Russian Poland into Austrian and Prussian Poland, although only for political objects. In 1894 he founded a journal called the *Robotnik* ("Worker") which was printed and, if not exactly published, at any rate was issued from

*ERIC J. PATTERSON, *Pilsudski* (Arrowsmith, 1935); EDWARD BENES, *My War Memoirs* (Allen and Unwin, 1928).

secret printing presses, chiefly at Lodz. In 1900 Pilsudski's flat at Lodz was raided by police, the press was discovered, and the printer was imprisoned at Warsaw.

Russo-Japanese War; but nobody else was ready for insurrection. A journey to Tokio and an offer to provide a Polish legion for the Japanese forces had no



The Republic of Poland.

[*From Patterson's "Pilsudski," by courtesy of Messrs. Arrowsmith.*

By successfully counterfeiting lunacy for some time, he obtained a transfer to an asylum in Petrograd. From there he escaped with the assistance of one of the resident physicians who was a young Pole. This man is now a medical professor in the University of Warsaw.

The next scene of activity was the former capital of ancient Poland, Cracow, in Austrian territory. From here Pilsudski seems to have tried to organise an insurrection in Russian Poland at the time of the success. The next ten years of Pilsudski's life seem to have been spent in work of military organisation. The organisation was to collect and train secret guerrillas which, according to Mr. Patterson, held up a Russian mail-train on one occasion in 1906 and seized about two million roubles for the use of the party. There was also a public side to the movement. In 1910 the Austrian Government recognised Pilsudski's Union of Riflemen as a legal body, so that from this time the *cadre* or frame-

work of quite an elaborate Polish military force with officers and almost a sort of staff college could be developed. "The Polish army was born before the Polish state." When it became clear in July, 1914, that the Central Powers were going to be at war with Russia, Pilsudski decided to use his legionaries on the Austrian side, or rather against Russia, for he acted practically as if he were independent. Early in August, actually before war was declared, he led his armed force across the Russian frontier. He had about 4,000 men.

The Rebirth of Poland.

In 1915 the German army occupied Warsaw and next year the Central Powers proclaimed the establishing of a Polish state, recreated, naturally, not out of Austrian or German Poland, but out of Russian Poland. Pilsudski, who had seen a good deal of active service with his legionaries, was invited to Warsaw and was made head of the military section of the new Polish Council of State. The Germans expected to secure a Polish army at their own disposal out of the new Polish state, but Pilsudski made so many difficulties about this that on July 22nd, 1917, he was arrested and confined in the fortress of Madgeburg. He had excellent quarters—three rooms and a small garden—but there was no chance of escape. He wrote a sort of autobiography, and so time passed until in November, 1918, two German officers came and explained in an embarrassed manner that a revolution was in progress and that he was free to go to Warsaw. He found there a Council of Regency, established by the Germans, which at once dissolved, but, before dissolving, handed over its powers to Pilsudski. Thus the end of the war found him, as death found him sixteen and a half years later, bearing on his shoulders the new Polish state. The Polish Committee in Paris, of which the famous musician Paderewski was a leading member, and which had organised Polish forces in the French army, now agreed to join Pilsudski's movement. With the collapse of the Central Powers, the new state quickly expanded from the former Russian Poland over the Polish-speaking territories formerly under Prussia and Austria. Thus ancient Poland was restored. A general election was held and in February the first restored Polish Parliament met. The Polish Government, represented by Paderewski and Dmowski, was among the signatories of the Treaty of Versailles (June 28th, 1919). Next year the new state had to meet a powerful Bolshevik invasion, brought on by Pilsudski's attempt to make a union of Poland and the Ukraine. Warsaw was saved and the tide of invasion was turned back by the Battle of the Vistula, August 14-16th, 1920.

For the rest of his life Pilsudski was the chief man of Poland, and was often called a dictator. Yet he was a curious kind of dictator, for although he was President once and Prime Minister twice, he was for most of his time in subordinate offices, such as Chief of the General Staff or Minister of War. His interests appear to have been chiefly military, yet his policy was never militarist, and his personality was quiet and retiring. For three years—May 1923 to May 1926—he was a private citizen and he emerged into public life only when he thought that the state was sinking into confused party strife. This, of course, is the favourite reason or excuse for the intervention of dictators against democracies. Pilsudski, at any rate, did not abolish, though he restricted, the democracy of the Polish Constitution, and he still refused to occupy the first place, either Presidency or Prime Ministry, though the National Assembly in 1926 elected him President by 292 votes to 193.

In person, Pilsudski was a fairly thick-set man, of medium height, with stooping shoulders and a thoughtful, rather melancholy, expression. In public he was taciturn and a little grim. At home he was happy with his wife and two daughters. Seldom appearing in public, he spent the last years of his life, still only Minister of War, in the Belvedere Palace at Warsaw, presented to him by the Polish nation. He applied his income as a Marshal to endow the University of Vilna.

Building Research in France.

The French review *L'Entreprise Française* has published a special number (Nov. 1935), containing full particulars of the Building and Public Works Laboratories (12 Rue Brancion, Paris), which were opened last June by M. Edouard Herriot, President of the French Association for the Development of Technical Education, accompanied by M. Luc, General Director of Technical Education. This special number, copiously and excellently illustrated, shows all who are interested in the mechanical strength, composition, etc., of building materials the powerful means of investigation which modern laboratories place at their disposal. In addition to the speeches delivered at the opening ceremony, the magazine contains articles on the constructional features of the building itself, on the history of laboratory tests (with some interesting reproductions of old engravings), and on modern methods for the study of solid materials. Tables show the ways in which the laboratory may be most usefully employed, and catalogue the various tests available. As M. Herriot remarked, the French have been noticeably behindhand in their study of materials, but the opening of this laboratory goes a long way to remedy the omission.

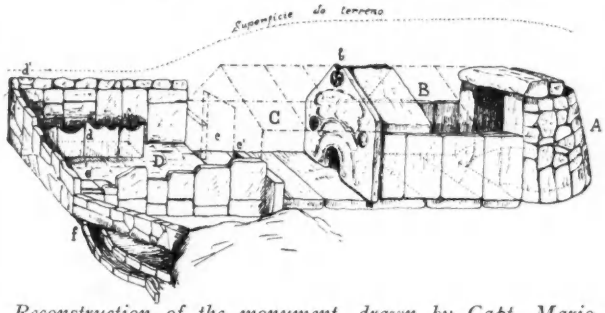
Prehistory in Portugal.

By a Special Correspondent.

Relics of the former inhabitants of the Iberian Peninsula are particularly interesting to British archaeologists, as a cognate culture evidently flourished in late prehistoric times all along the Atlantic seaboard. The ruins of Citânia are especially well preserved and have yielded many important finds, and recent discoveries there open up an interesting field for research.

ANYONE with archaeological leanings who makes an exploration of the Iberian Peninsula should not fail to pay a visit to the ancient hill-settlements of Citânia de Briteiros and Sabroso, in the north of Portugal. Citânia is the larger and perhaps the better known, but Sabroso claims special attention for the strength of its site and the remarkable remains of cyclopean masonry that have survived in its protecting wall.

The noted Portuguese archaeologist, Martins Sarmento, made these prehistoric sites his special care, and it is largely due to his forethought that their old stone buildings have not been destroyed or used as a quarry. Such remains of importance as had already been removed in his time were collected by him in the charming museum that bears his name in the little neighbouring town of Guimarães. It may here be noted that the remote attractiveness of the surrounding country lends an extra pleasure to the exploration of these ancient sites. Good roads permit of driving to within a short walk of the goal, and very fair accommodation is available at Guimarães and other accessible towns.



Reconstruction of the monument, drawn by Capt. Mario Cardoso. A: fire-chamber; B: gabled apartment; b: "pedra formosa"; C: open (?) antechamber; D: atrium; d, d¹: tank, and double conduit for filling it; e: remains of stair; f: waste drain.

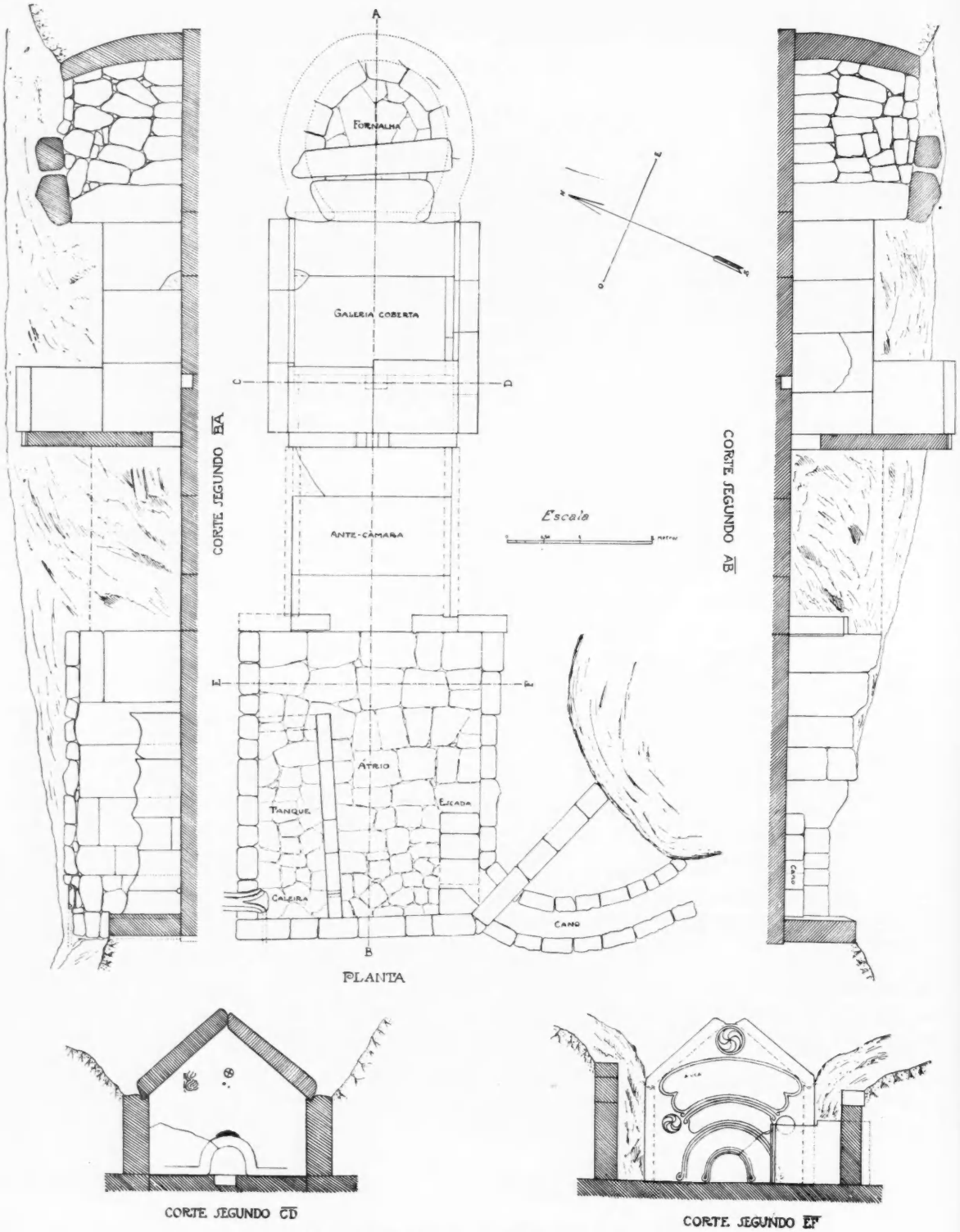
One of the most conspicuous objects in the Museu Martins Sarmento is the decorated stone slab, roughly pentagonal in shape, known as the *Pedra Formosa*. Its dimensions are about 9 ft. 6 in. by 7 ft. 7 in. by 9 in. Until recently this was exhibited in a horizontal position, as it was believed to have served as an altar-slab, and the channels cut on its face were regarded as conduits for the blood of sacrificial victims or other votive liquids. Before dealing with the recent discoveries that have exploded this theory,* it will be of interest to examine the eventful and little-known history of the *Pedra Formosa* itself.

Writing in the 18th century, F. X. da Serra Craesbeck says (significantly, as will be seen) that the stone was found in a "pit" (*cova do terreno*) on the hill of Citânia de Briteiros. With the aid of seven yoke of oxen it was removed to the farm of the parish priest, near the river Ave. The exact date of its removal is not known; Dom Luis Alvares de Figueiredo, Bishop of Uranopolis, places it at the end of the 17th century, and Gaspar Estaço saw no signs of ornamented stones when he was at Citânia in 1625, so it was probably not discovered until late in that century.

It remained at the parsonage until 1718, when it was transferred (this time by eleven yoke of oxen) to an enclosure in front of the church of S. Estevão de Briteiros. A local legend relates that a Moorish woman (*moira*) carried it on her head from Citânia to the church, spinning as she went. In 1876 Martins Sarmento, who had begun his excavations at Citânia, decided to take the *Pedra Formosa* back to the old hill site. A special track had to be cut up the hill and this time 24 yoke of oxen were needed to pull the much-travelled stone back to its native citadel. It was put in one of the circular huts which had been tentatively rebuilt and covered with thatch. In 1897, finding that the risk of damage at Citânia was even greater than beside the church, Sarmento finally decided to take the great block to the cloister of S. Domingos at Guimarães, where he had founded an archæological museum. And there it may be found to-day, but now it is mounted in a vertical position and not horizontally.

This change of position is due to an accidental discovery of the highest archaeological importance. A few years ago, in order to enable the members of an International Archaeological Conference to reach the summit of the Citânia hill in comfort, a roadway was made from the village of Briteiros. While cutting away the hillside some workmen uncovered a

* The discovery (near Burgos, etc.) of similar stones, of much smaller dimensions, serving apparently as the fronts of miniature model temples, had already cast a doubt on the established interpretation.



Plan and elevations of the ancient building excavated at Citânia.

group of large worked stones, beneath which they noticed that the earth was loose. Scenting hidden treasure, they reported to the foreman who, in his turn, passed the information on to one of the directors of the Sociedade Martins Sarmento, the local archæological association. Further excavation resulted in the discovery of an underground chamber, incorporating as one of its principal members a stone slab of a size and shape almost identical with those of the *Pedra Formosa* and with an evidently cognate scheme of decoration. If further proof were needed, it was provided by another find that was made a few hundred yards higher up the hill. The diversion of the roadway to avoid the first stone chamber, insisted upon by the Sociedade Martins Sarmento, did not suit the plans of the road-contractors, so that, when a similar chamber was found on the route the road was to take, they said nothing about it but ordered their employees to cut right through it. As a result nothing is left here but the stones of one side of the chamber, though these are identical in arrangement and material with those of the one discovered lower down the hill. The absence of a large stone slab in this instance makes it seem possible that this was the site of the original *Pedra Formosa* itself.

The new "Pedra Formosa," showing the decoration of concentric bands, and three sun-like disks.

As shown by the accompanying elevations and plans, the "chamber" consists of an elongated area sunk slightly below the ground-level. The semi-conical apartment at the east end was evidently a fire-chamber, as traces of smoke-blackening were found on stones that had fallen from the roof and had once surrounded a smoke-vent. Next to that came a gabled gallery, walled, roofed, and floored with hewn stone. These two compartments were certainly subterranean. The exit from the covered gallery was made through the small semicircular opening at the foot of the new "*Pedra Formosa*," just large enough to allow passage to a slim man. An antechamber, perhaps unroofed, but also paved with large slabs, separated this from a wider "atrium" which was paved with small stones, and in one corner of which was a tank fed by a two-way conduit allowing running water from outside to flow either into the tank or to a waste-vent in its west wall. The atrium was approached from outside by a flight of descending steps, beneath which a drain had been constructed to remove superfluous water.

The original Pedra Formosa, damaged by exposure, with decoration showing the band and disk motives. The two slabs are shown on the same scale.

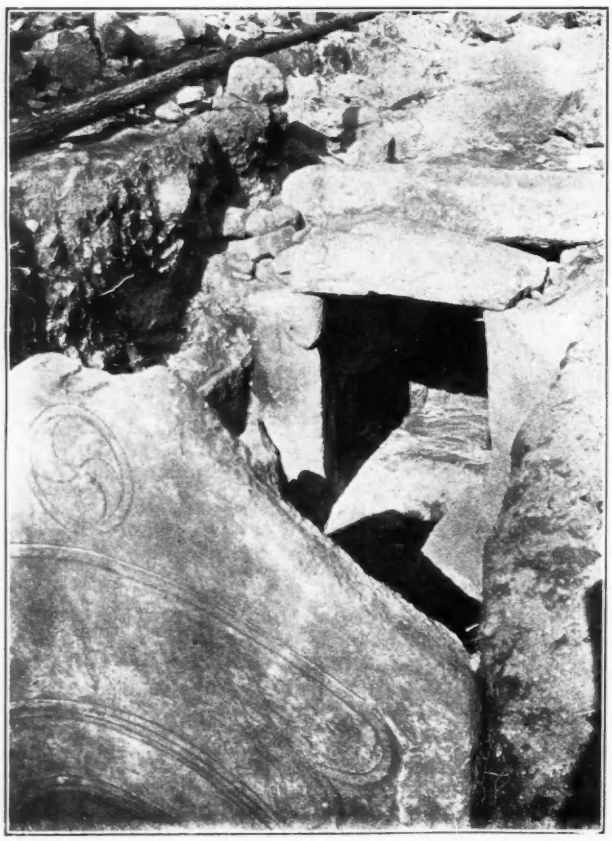
The new "*Pedra Formosa*" was less elaborately carved than the original one, and was slightly smaller, its dimensions being 7 ft. 8 in. by 7 ft. by 8 in.

The function of this elaborate structure remains in doubt. Its subterranean location suggests a funerary purpose, and it might have served as a crematorium, whether private or public. The bodies would have been burned in the fire-chamber, while the tank would have been used for lustration by the officiant. Mr. Seán P. O Ríordáin, the

distinguished Irish archaeologist, who visited the site last year, makes the alternative suggestion that the building might have served as a sweat-house, though its construction is of a more elaborate nature than in examples known in Ireland. This might be accounted for, however, by the contact of the people of Citânia with the bath-loving Romans. In any case, the building remained in frequent use for a considerable period, as is proved by the wearing down of the central floor-stones by the constant passage of feet. The additional discovery inside the building of a quantity of polished stones of irregular shape and size suggests that these were used to keep the floor clean and polished. The two principal floor-slabs, on either side of the "*Pedra Formosa*," were of a specially hard kind of granite, unlike the remainder of the monument; this, in common with most buildings in the district, is of a fine-grained granite, comparatively soft and easily worked. Little enough is known generally of the manner of life of the "Lusitanians" who inhabited Citania, and the new material now available should stimulate research in this direction.

The excavated building, showing the front of the new "Pedra Formosa" viewed from the entrance of the atrium.

[For much help in this article we are indebted to Mrs. Hubert Jennings, of Oporto, and we owe grateful thanks to Captain Mario Cardoso, of the Sociedade Martins Sarmento, for permission to reprint the plans and drawings from the Society's *Review*.]



[*Another view of the excavation, showing the entrance of the fire-chamber.*

New Population Map.

The latest production of the Ordnance Survey, Southampton, is the simplified and extremely clear map, on the scale of a half-inch to a mile, entitled, *Population of Greater London* (paper, 1*s*. 6*d*.), supplemented by a series of five profiles (paper, 9*d*.) struck at random across the area concerned. The interpretation of the term "Greater London" is generous, as the map extends from Royston to Horsham, and from Aylesbury to Chelmsford. All irrelevant detail is suppressed; perhaps almost too much discretion has been used in this respect, but the result is, at any rate, to make the gradation of population—indicated by a scale of brown tints—stand out all the more clearly. Points of maximum and minimum density (of course, approximate) are marked by datum numerals.

"Ribbon" development along the roads is less prominent that might have been expected; more noticeable is the spread of population around the satellite towns. Such places as Chesham and Sevenoaks, isolated townships a few years ago, are now the centre of clearly marked areas of population, the density decreasing only slightly within a widespread area. A curious omission, by the way, in a map where railways are of significance and are for the most part clearly indicated, is that of the branch-line from Chalfont to Chesham. This makes the latter place appear what it is not, a satellite town untapped by the railway, which would be a unique phenomenon.

This map is a valuable contribution to human geography, and will be particularly useful in conjunction with the products of the Land Utilisation Survey.

A Defender of the Birds.

By E. W. Hendy.

A BOOK of the highest importance* has originated from the correspondence that appeared in *The Field* in 1934-5. The state of affairs which it discloses will be a revelation to many. Egg collectors are a furtive race: it is only now and again that their misdeeds are exposed.

Few will read this tale of petty pilfering without disgust. In his Foreword, Lord Desborough, the owner of a bird sanctuary which re-established the bittern as a breeding species in England, calls collectors an unmitigated nuisance, a perusal of this book suggests that this is an understatement. There is a full account of the prosecution of a well-known collector and his local agent for taking crossbills' eggs: the defence advanced was that the eggs were greenfinches'! The total fines and costs imposed amounted to nearly thirty pounds. The correspondence as to certain red-backed shrikes' eggs acquired by the same collector is also illuminating. Some confusion arose as to whether forty clutches or forty series of clutches were taken. Eventually, it was shown that the hoard consisted of forty series amounting to one hundred and forty-six eggs, and comprising the full layings of forty birds throughout the season. Mr. Parker remarks that he had not supposed that such a collector existed.

There is also the incident of the collector who, in August, 1932, wrote an article in *The Field* upon the kite, in which he deplored the dwindling of the species in Wales, and expressed the hope that nothing would be allowed to jeopardise its chances of survival in its few remaining haunts. A week or two later the Secretary to the R.S.P.B. pointed out that the writer of the article had, in the previous September, exhibited a clutch of freshly taken British kite's eggs at a meeting of the British Oological Association.

Three months were spent one year in trying to catch a notorious collector in the Cairngorms who was after greenshanks, crested tits, and dotterels, but inadequate legal powers prevented his capture. Another collector kicked guillemots' eggs into the sea in the hope that subsequent layings might produce the erythristic eggs for which he was looking. One of a party that was being shown over a Norfolk ternery lagged behind and attempted to carry off three terns' eggs. And so on, until I said in my haste, "Now Barabbas was an egg-collector."

How do egg-collectors defend themselves against these damning facts? Some assert that gamekeepers "who shoot at sight all unknown or uncommon birds" do far more harm than collectors without incurring censure, a plea reminiscent of the old saw, "if you have no case abuse your opponent's attorney." This class of gamekeeper does receive censure. And if he exterminates, why abet him by destroying birds in embryo?

Another plea is that if a bird is robbed of its first clutch it soon lays a second. But what if some phil-ornithist filches the second clutch, and another, or the same one, takes the third in order to acquire "the full layings throughout the season" of some unfortunate species? I may add that, in my experience, second clutches of some species are smaller and often contain infertile eggs.

It is also urged that the egg-collecting work of former ornithologists is the foundation of our present knowledge of ornithology. If this be true it may have been excusable: they were pioneers; but why duplicate their specimens to-day? What branch of science can egg collecting now advance? "Settling a definite scientific problem" was the excuse given for the taking of the one hundred and forty-six red-backed shrikes' eggs. Whatever the problem was, most of us would prefer to let it remain unsolved. Observation of the behaviour of the parent birds during incubation and of the nestlings in the fledging period, such as has recently been carried out as to common buntings, has far greater scientific value.

A point which the defenders of egg-collecting conveniently ignore is that all rare eggs are protected by law and their taking is illegal.

The "Black List" Remedy.

What are the remedies for this sorry state of affairs? One correspondent suggested that, as egg-collecting was a kind of kleptomania, segregation of the fraternity during the nesting season was the only cure. But this is, alas! a counsel of perfection. The law is, we know, ludicrously inadequate, but its amendment would, for various reasons, be very difficult to attain, as Mr. Parker regretfully admits. He favours the enlistment of a group of voluntary watchers, the publication of a black list of egg-collectors, with photographs, the prohibition of the sale of the eggs of protected birds, and the more rigorous enforcement of the present law. To which I should like to add my own suggestion—that a watch be put upon one or two notorious egg-collectors during the nesting season and convictions obtained *ad nauseam*. In time they would weary of paying fines, which might amount to one pound per egg and costs.

Only a strong public opinion will put an end to this scandal. Mr. Parker's exposure of the methods of egg-collectors will help to create and strengthen it. All bird lovers owe him a debt of gratitude for this book.

* *Ethics of Egg-Collecting*. By ERIC PARKER, M.B.O.U. (The Field, 5*s*.)

The March of Knowledge.

New Quarterly

The danger of modern Science dividing itself into watertight compartments is becoming daily more imminent. And it is to avert this danger that the new quarterly *Annals of Science* (Taylor and Francis. 6s. 3*d*. per copy or £1 per annum, post free) has been started. The Editors—Dr. D. McKie, of University College, London; Dr. Harcourt Brown, of Washington University, St. Louis; and Mr. H. W. Robinson, Librarian of the Royal Society—state their policy clearly in their first editorial. Such policy, we are glad to note, includes reference to the personal side of scientific annals, as well as to the more purely historical. The first number is distinguished by a notable team of authors, articles of widespread interest, and some stimulating illustrations. We wish the new review every success.

Coke for Soil Warming

A new use for coke has been developed recently in certain areas in soil warming, for the production of early crops of salad and other vegetables, bulbs, etc. This system, which employs a number of pipes buried in the soil 15 to 18 in. below the surface through which warm water is circulated, raises the temperature of the soil to between 70 and 80° F. Not only is this cheaper to install than a greenhouse covering the same area, but very satisfactory increases in total yield of crops are obtained at dates considerably earlier than in unheated plots.

The Study of Alchemy

A group of scientists, with Professor J. R. Partington at their head, have formed themselves into a Society for the Study of Alchemy, a subject that is of romantic interest in itself, and of importance because of its relations with the history of early chemistry. Regular meetings and discussions, beginning this year, will be held, and a periodical journal is to be published.

More Peking Skulls

Further relics of Peking Man, of which parts of four jaws and a fragment of brain case were the most important, were brought to light in 1935. The latest review of the material by Dr. Franz Weidenreich of the Peiping Cenozoic Laboratory, while confirming the position of *Sinanthropus* as an independent hominid type, suggests on certain structural points of evidence that not only does *Sinanthropus* take his place in the direct line leading to modern man, but that of recent races, the Mongolian group has the closest affinity to Peking man. The absence from the cave of all bones but those of the skull and a few fragments of limb bones, it is thought, may well indicate that they were introduced there as a consequence of either head-hunting or cannibalistic activities.

Everest Again

A fifth attack on Mount Everest is to be launched this Spring, permission for the assault having been obtained from the Tibetan authorities. The team of climbers who are making the attempt have been chosen on account of their thorough acclimatisation. Experience has proved that only mountaineers possessing both exceptional climbing skill and proved ability to withstand the rarefaction of the air can hope to face the hard conditions met with on the "roof of the world." But the list of names of those so far chosen to make up the party (as reported in *The Field*) leaves no doubt that the human material will be of the highest quality.

Pacific Entomological Survey.

The Marquesan project of the Pacific Entomological Survey, of which Mr. E. P. Mumford (one of this year's Leverhulme Research Fellows) was appointed Director in 1928, is now nearing its most interesting stage. Over a hundred taxonomic papers have been issued in connection with the work as a whole, and Mr. Mumford is now in the Hope Department at Oxford, working on an extensive summary and review of the work as a whole. Patterned to some extent on the classic researches of Dr. R. C. L. Perkins in Hawaii, the Marquesan investigations consist essentially of a primary ecological survey, or study of the insects in relation to their environment—physical and biotic. The Marquesa-Islands are among the most isolated in the world, and were described by Perkins as "the choicest part of the oceanic islands of the Pacific after Hawaii."

The final work may be of interest, not only to entomologists, but to geographers, botanists, meteorologists, and ethnologists. The interior of many of the islands was mapped for the first time, series of host plants collected, meteorological observations initiated (Univ. Calif. Public. in Geography, Vol. 6, No. 4, pp. 147-172, Berkeley, Calif., 1933), and native names of animals and plants, as well as place-names, collected.

A preliminary report was reviewed in *Nature* (Vol. 130, pp. 797-798). A brief account of the terrestrial and fresh-water fauna appeared in *Ecology* in January, but Mr. Mumford's final report is still to come.

National Trust News.

It was announced at the National Trust lunch at the end of last year that the Watersmeet Valley appeal had at last been brought to an end, which means that success has rewarded the great effort which was started in 1931. Watersmeet is an extremely well-known place and hundreds of visitors go there every year. The property which is now being bought is an area of 340 acres and is divided into two portions, one on each bank of the East Lyn river. This river and the Farley Water meet in the middle of the property, which is thickly wooded.

Another National Trust fund which was mentioned in these columns a month or so ago was for Bolberry Down in South Devon, and in this case also the necessary money has been found. This is particularly satisfactory owing to the fact that Bolberry was practically the last remaining piece of cliff unprotected in the long stretch of coastline that already belongs to the National Trust in the neighbourhood. The Bolt Head near Salcombe was originally bought in 1928 and the Bolt Tail in 1931. Several intervening portions, including the farm and the Courtenay Walk brought up the total acreage to 980. This is one of the least spoilt stretches of cliff on the whole of the south coast and five continuous miles of it will now be preserved for all time.

Farther west at the extremity of Cornwall the National Trust owns a part of the Lizard Downs which is very nearly at the southernmost point of the British Isles. Moreover, a few years ago, Sir Courtenay Vyvyan handed over as a gift an ancient camp known as Treen Castle with 25 acres of wild and beautiful cliff land and the famous Logan Rock. Now the Trust has secured a third property close to Land's End. This consists of land between Land's End and Sennen, and includes a cliff castle, a ring barrow, and a ghost. The story about the ghost is connected with an adjacent rock called the Irish Lady. In the reign of Charles I a ship sailing from Ireland was wrecked here in a terrible gale. All were drowned except one, a lady of great beauty who managed to climb to the top of the rock. She clung there for three days, but could not be reached by those who watched from the cliff top and at last, exhausted, she slipped into the sea. It is said that in times of tempest she can still be seen, a rose between her lips by day, a lantern in her hand by night. This interesting acquisition is due to the efforts of Ferguson's Gang, the Trust's mysterious benefactors, who announced their intention of trying to acquire this land some months ago and who called at the office of the Trust recently to leave the money they had collected for the purpose.

Iron Tors, Dovedale, the limestone cliffs on the Derbyshire bank of the Dove, presented to the National Trust by Mr. E. H. Kerfoot.

Close to Weston-super-Mare in Somerset lies the village of Kewstoke, behind which rises a hill commanding a most extensive view over Sand Bay. Kewstoke is a village of considerable historic interest and in its immediate surroundings there are numerous prehistoric remains. Down the hill behind the church there descends a huge flight of steps called by the name of St. Kew (probably identical with St. Kevin). It is believed that the steps originally went down to a rudely built landing-place, but in medieval times they were turned westward in the direction of the church. This historic site has now been handed over to the National Trust.

Coming further north, the Trust is happy to be able to record an important acquisition in the region of Dovedale, probably the most widely known of all the valleys of the Peak District, quaintly described by Tennyson as "one of the most unique and delicious places in England." In the past two years the National Trust have, through the generosity of private benefactors, secured the preservation of considerable parts of the valley. On the last day of 1935 Mr. E. Hodgson Kerfoot of Buxton and Manchester told the Trust of his intention to present, in commemoration of the Silver Jubilee, 100 acres in all, comprising the Iron Tors and the Nobbs, a generous offer gladly accepted.

The Iron Tors are bold outstanding limestone buttresses with varied woodland immediately north of the property presented by Imperial Chemical Industries. The Nobbs, also on the Derbyshire bank of the river Dove, are opposite the Hall Dale property presented by Mr. McDougall. The Nobbs, which command a very extensive view of the Peakland summits, includes short scrubby trees and brushwood, and has distinctive flora.

Book Reviews.

The Development of Sumerian Art. By C. Leonard Woolley. (Faber and Faber. 30s.)

This is not a historical account of Sumerian archæology but rather a careful study for art-history students of the way in which Sumerian artistic effort steadily developed from a primitive to a complex and sophisticated stage. As such it will take its place among those few and exceedingly useful text-books which provide the raw material for æstheticians and historians of art Sir Leonard Woolley shows carefully how each stage of development depended on its predecessor, how Sumerian art was largely inbred and hardly drew any inspiration from outside. Indeed it is hard to see how it could have done so, for Sumerian art is virtually the first art in the history of the world (excluding, of course, Palæolithic art). That, above all, is the importance of this volume: for we are here shown an art painfully struggling to develop in a region where mud and reeds were the only media for the artist and the architect. We see Sumerian palaces tracing their ancestry back to wattle and daub huts and retaining the most primitive elements in an age of grandeur. We see how the first great artistic advance appears when there first occurs a fusion of races from which the "Sumerian" developed. This fusion was of the original Iranian stock of the plains—the most primitive of all Mesopotamians—with Anatolian and North Syrian intruders. Once the fusion was established, there was an impetus for art. With the origins of art there come also the origins of writing. An elementary pictographic script is perceptible at a remarkably early stage. In art there appears a taste for the depicting of animals. Since some of the animals are northern and mountain types we get a clue as to one at least of the artistic influences now developing, the influence that later became the astonishing "animal style" of Northern and Central Asia. Here is a clue to Sumerian origins and the fact that animals figure so largely and so successfully in the later Sumerian repertoire is significant. Stone sculpture, the first essay in the world in this medium of art since premature Palæolithic attempts, started early in the 4th millenium, and this beginning is all the more remarkable since stone is non-existent in the plains of Sumer. Here again we meet a northern element. Almost at once we see the forming of what we call "style," that is, something common to the æsthetic outlook of each artist. There is some realism, much experiment, but on the whole a steady adherence to simple forms which, of course, is largely dictated by the shape and nature of the material employed and the means of workmanship. Beauty is achieved only occasionally. Slowly the experimentation ceases and a sophisticated tradition is established. To the end Sumerian sculpture retains the elements of this fixed tradition. For Sumerian art is conservative.

With the major art of sculpture well started Sumeria can be said to have laid the foundations of the art of the Old World. Her minor arts show more variety and invention, but rarely emerge from the classification of minor. The inlaid mosaics of lapis lazuli and shell in a bitumen base are charming and immensely skilful but they indicate a frittering away of artistic energy in typical oriental manner on detail and problems of intricacy. Only in the art of the goldsmith and metalworker does the Sumerian artist show an amazing sense of plain form and unspoiled good taste. Egypt has nothing at all to compare with the gold vessels of the Ur graves. These vessels are indicative of a very refined knowledge of proportion and sensibility which is not seen again until the time of Greek vase-making or of early Chinese bronzes. In metalwork alone Sumerian artists can rank among the great artists: the Sumerian love of simplicity is exhibited also in the later sculpture where, once the methods of working the medium had been mastered, the artists got down to essentials and made real works of art. The Gudea series of statues almost rank, as sculpture, with the best works in hard stone of early Greece and Egypt. All that they lack to place them on an exact equality is the desire to vary and invent which characterises 4th Dynasty Egyptian sculpture and all Greek work at all times. In skill and technical accomplishment there is no difference between Sumerian Greek and Egyptian work, all the more remarkable in view of the fact that the average Sumerian never saw rock or boulder or quarry. All stone was an imported rarity.

The author traces the development of every branch of art and gives us the fullest archæological corroboration for every date and for every stage of development. This is a notable book and one which every student of art should read, if only because it is a plain statement of facts devoid of subjective judgments or hypotheses.

Stanley Casson:

Fishes, their Way of Life. By Louis Roule. (Routledge. 12s. 6d.)

That this book should be full of sound information is what we expect from the author's eminent position, but how few can combine this with a style and choice of material that make his book a delight to read!

The book begins with an account of those small transparent floating plants and animals upon which the whole fish economy is based, for though the green matter of plants with the energy of light is the sole origin of all food for every animal, in the sea the larger seaweeds are rarely eaten, the microscopic plants being the first step in nutrition. Professor Roule then gives some of the fruit of his wide experience of fishing in both sea and fresh waters, of fish culture and the introduction of foreign species, and the factors, both internal and external, which mean success or failure in the struggle for existence. He can then explain the reasons why some waters are inhabited by certain species and not by others. The examples selected of the more striking adaptations for offence and defence, such as poison spines, electric apparatus, the teeth of sharks, and the queer sheltering places of *Fierasfer*, include much that is new, or not easily found elsewhere, but the chapters on normal fish life, such as, "What Fishes See" and "The Vibratory Sense" are even more interesting.

Two features of the book especially interest the present reader, viz.: the descriptions of the human aspect of the fishes' homes, scenery—and even the cooking of *bouillabaisse*—and the philosophic reflections arising from the subjects discussed. The former, though but a few words are given to each case, transport the reader to the sea, the lovely rivers and ponds of France, and even to the desert. In no way are these descriptions out of place, or

of merely decorative effect, they are of the highest value in bringing the reader into touch with reality, as near as possible to that strange remote world of the fishes, and always emphasise the fact that the author is treating of living fish, not museum specimens. Neither should the reader neglect the paragraphs dealing with the philosophy of biology. Nothing is stale or slow in Professor Roule's mind or writing.

In short, this is a book of that rare kind which should be read by the student of biology, by the amateur fisherman, and by all who care for the world in which we live. To know our own world is not the only essential in education: we must also know what we can of the world outside human interests. This book opens a window into both.

CYRIL CROSSLAND.

Pigeons and Spiders. By MAURICE MAETERLINCK; translated by BERNARD MIALL. (Allen & Unwin. 4*s.* 6*d.*)

The name of Maeterlinck carries such literary prestige that there is danger that some of it may be conveyed to his so-called scientific writings. He is the modern Lucretius, who has attempted the expression of the exactitude of Science in the emotional terms of poetry. The fanciful philosophy of the pure writer is incompatible with the precision of scientific thought.

His facts are wrong. The freshwater spider, *Argyroneta aquatica*, is not by any means little known. It has been a familiar subject among writers on popular natural history in this country for several generations. He states that hitherto it has been reported only in the more or less southerly waters of Europe, yet, four pages later, he writes that it does not seem to occur further south than the Loire. The facts, as stated by authority, are that "it is not at all rare in ponds and ditches in the southern half of England, and is well known on the Continent, where it ranges at least as far north as Denmark" (SAVORY, *The Spiders of the British Isles*, p. 33), and that it is "familiar in Europe and northern Asia" (SAVORY, *The Arachnida*, p. 80).

Again, on p. 80, M. Maeterlinck alludes to "Social Orthoptera"; presumably he means the Isoptera, for no Orthoptera are social in the strict sense. He quotes Livingstone as an authority upon the Termites, not upon a point of observation, which no one would dispute, but upon a point of interpretation. No, M. Maeterlinck is not up to date in his zoology. He seems to think, too, that these spiders are the only aquatic air-breathers (p. 58), appears not to know the laws of capillarity (p. 64), and stands self-condemned by his constant allusion to spiders under the term "insect," which, he claims, "preceded us by thousands, even by millions, of years."

His account of pigeons is entertaining to read, so long as he makes no attempt to be a zoologist; he brings out some charming ideas, that, for instance, the kisses of adult lovers are but the reminiscence of the kiss alimentary, as seen in the feeding of squabs, and that these uxorious birds enjoy the "days of an inimitable life, such as man has never known." Perhaps the theosophists will agree that the ultimate rewards of a spotless life will be reincarnation as a pigeon.

The author assumes that "the principal crosses were produced spontaneously, that man, once again, got to work only when almost everything had been done." Does he really think that it has ever been suggested that man by selection could originate a breed?

The only statement in the book that merits serious attention is that the sense of orientation of passenger pigeons is disordered in the neighbourhood of the great radio transmitting stations, but here again he betrays his incapacity to understand the scientific method by the omission of authority, for which this book cannot be cited.

But as a literary effort, the appearance of the work is an event which is beyond the scope of DISCOVERY to discuss, though we may be permitted to express our admiration at the excellence of the translation.

Zoological Technique for Teachers and Senior Students. By T. L. GREEN. (Allman and Son. 5*s.*)

The author of this book has filled a gap in educational books on zoology, and teachers of this subject will quickly appreciate it. In addition to having a knowledge of the subject, teachers of zoology have to do a considerable amount of preparatory work, both for themselves and for their students. It is in connection with this preparatory work that many unforeseen difficulties arise—difficulties so far as new teachers are concerned, but possibly matters which are well known to the steward of a laboratory where zoology is being studied. This book gives freely of requisite "hints and wrinkles." It tells the teacher where to obtain material; how to kill, preserve, and store it; and the sequence of operations in the preparation of class material, from amoeba and hydra to worms, leeches, crayfish, and frogs. Other chapters are devoted to histological technique, to the making of microscopical preparations, and to microtomy. We are told in great detail, and yet very concisely, of the art of fixing to preserve structural detail of cells and tissues, staining in general or to show only certain components of the cell or tissue, dehydration, clearing, mounting, and the choice of a mounting medium. With regard to microtomy, it is stated that the actual cutting of thin sections with the microtome is not at all difficult, but too few schools seem prepared to undertake it. The question of starting a school museum is also considered, with notes on storage and exhibition, preserving media, models and casts, preparation of skeletons, and the practice of injection. Another part of the book deals with setting up and stocking an aquarium, which is of obvious value in helping to reduce the costs of the class by supplying specimens. A vivarium, however, is considered to be equally essential for keeping and observing the habits of the living organism, and additional notes on vivarium methods are given. Separate chapters are devoted to the teaching of dissection, to hints on manipulating the microscope, and to the use of the cinema in teaching zoology. The book is suitably illustrated and is interleaved with blank paper for the making of notes.

Industrial and Manufacturing Chemistry: Part II, Inorganic. Edited by GEOFFREY MARTIN. Vol. I., 5th Ed. (The Technical Press. 28*s.*)

This work, in its complete form, aims at giving a brief survey of the chemical industry, and as such its popularity continues undiminished. Ten experts have assisted the editor in the preparation of this particular volume, and are a guarantee that the minutest care has been exercised in ensuring accurate descriptions of the industries concerned. In all there are fifty sections, each being a complete monograph with bibliography. One great difficulty in compiling such a treatise as this arises

from the rapid advance now taking place in many of the industries grouped together as "chemical." The joint authors, however, have done their work admirably. They have also utilised the patent literature to the fullest extent since many patents, although impracticable, often contain the germs of valuable ideas.

The Voyage of the Tai-mo-Shan. By MARTYN SHERWOOD. (Bles. 12*s.* 6*d.*)

This book has one merit, that the author disclaims all literary merit, yet has the greatest merit of all, frankness and simplicity. It is a breezy account of an enterprising undertaking by a party of young naval officers, in which we find odd titbits of information. Before eating a puffin, for instance, it is not enough to pluck him; you must skin him; all Pacific fish are diseased; a bird is easier to pluck if it is dipped in warm water first; porpoise liver (or was it dolphin?) is good eating, and one liver provides steaks for 30 men. The account of an albatross alighting on the water is interesting and unusual, like the whimbrel that could not get his sea legs, and used his beak as a third. It is all such good reading that we must not be captious, and complain if his fishes have lungs, or be surprised that his educated Aleut could read *Greek*, as a member of the Greek Orthododox Church.

Snow Baby. By M. A. PEARY. (Routledge. 6*s.*)

Marie Ahnighito Peary was born farther north than any other white person. Also she was called "Snow Baby" by the "Arctic Highlander" Eskimos. These, she says, are her only claims to distinction, but another is surely that she is the daughter of the late Rear-Admiral Robert Peary who first reached the North Pole. Her book is written, we imagine, largely for children, but this should not deter others from reading it, for it is written with charming simplicity and modesty and contains not only a daughter's memories of a great explorer, but also a delightful insight into the ways of the Greenland Eskimo. There is abundance of incident of a widely varying kind. It is a pity that there are not more illustrations.

The Great North Pole Fraud. W. HENRY LEWIN. (C. W. Daniel. 7*s.* 6*d.*)

This book would be remarkable if only for the fact that the author sets out to convince his reader that Peary never reached the North Pole, succeeds in the first half-dozen pages, and yet holds his interest for the remaining two hundred. It is also remarkable, however, for the reason that although it represents the culminating point of more than twenty years of propaganda directed towards one object, the discrediting of Peary—twenty years filled with rebuffs for the author—yet there is no tinge of malice, no touch of intemperate argument, from beginning to end.

Mr. Lewin has no personal grudge against Peary. Only when he realises that he stole from Nansen, "that superlative Viking," the honour of "farthest north," is there a hint of warmth. He contents himself with simply presenting the evidence. He shows how Peary's notes and photographs were forged; how his previous record of polar trickery was against him; how it would have been impossible for him to travel at the tremendous rate he said he did; how the odd behaviour of Captain Bob Bartlett, skipper of the ship, the book of Henson, the negro, who alone accompanied him on the last march, and the mysterious death of Professor Ross Marvin, all tell against Peary having reached the Pole. Yet he makes no definite assertions; he leaves the reader to assess his guilt. Did he merely succumb to temptation on rejoining the ship, when Bartlett's first words, spoken at hazard, were, "I congratulate you, Captain, on reaching the Pole"; or was he, as Captain Hall's monograph reprinted at the end asserts, responsible for a planned fraud and for the murder of Marvin to cover up his tracks?

What Mr. Lewin thinks he does not reveal. Generously, he strenuously defends Peary against the "incitement to murder charge." But with a proper respect for, though not sentiment towards, a man who is dead, he demands that Peary's conquest of the Pole be expunged from the honourable records of the world's Geographical Societies, just as his false discoveries of the Peary Channel, East Greenland Sea, Crocker Land, Jessup Land, were all expunged from the charts of the United States Navy. Who can deny that to admit its blunder is a debt which Peary's generation owes to posterity?

Through the Wilderness. By H. J. MASSINGHAM. (Cobden-Sanderson. 15*s.*)

The hasty reader of Mr. Massingham's new book may be tempted to say, with the Scottish laird who had discovered Dr. Johnson's Dictionary, that it is "fine confused feeding." For he describes at length the building of his little house and the planting of his garden on the Chiltern slopes near Princes Risborough, laments the recent dry summers, discusses the birds of his countryside, denounces the unsightly bungalows that deface so many old villages, passes on to a detailed account of the Icknield Way and the Ridge Way, and concludes with a highly technical argument to show that the prehistoric invaders of England drew their inspiration from Minoan Crete. The title may thus be construed to imply that the author is struggling through the uncharted past, which he seeks to relate to the present. His main object, however obscured by engaging digressions, is, in fact, to plead for a fuller recognition of man's duty, so to say, to the land on which he lives. Wandering on the Downs and delighting in the ancient camps and barrows, Mr. Massingham has persuaded himself that Neolithic man had a greater respect for the amenities of his neighbourhood than is shown by civilised man in the 20th century.

It is a pleasant fancy, though of course we do not know wha the hunters of the Old Stone Age thought of these new-fangled Neolithic inventions which, in their time, marred the contours of their hitherto untouched hills. And if the author in his enthusiasm tends to forget that most town workers cannot live where they please, as he does, and are thus at the mercy of the speculative builder, he is all too fully justified in his protests against the defacement of many picturesque places by houses which do not accord with their environment. Until public opinion can be educated to demand a higher standard of house-designing, the "barbarian invasion" of the countryside will presumably continue.

The most informing section of the book comprises the chapters on the prehistoric trackways, which Mr. Massingham followed on

foot from the Chilterns to the Cotswolds. His engaging description will send many a reader along the same route, to be amply rewarded, as the excellent photographs of Avebury, Barbury Camp, Wayland's Smithy and other famous monuments show. The final chapter on Cretan influences in prehistoric England is plausible. Sir Arthur Evans himself has pointed out that the megaliths in Malta are analogous on the one hand to those of Crete and on the other to the chambered long barrows of Britain, such as Wayland's Smithy. Mr. Massingham's tentative explanation of the Uffington White Horse as somehow connected with the worship of Demeter or the Great Mother of Minoan Crete is an ingenious addition to the many conjectures which that strange hillside figure has provoked.

A History of the Roman World from A.D. 138 to 337. By H. M. D. PARKER. (Methuen. 15*s.*)

The growth of the Christian Church through persecution to triumph under Constantine lends high importance to the second, third, and early fourth centuries of our era.

From the secular standpoint they are a depressing anticlimax to the vigorous promise of the Roman Republic and early Empire. Mr. Parker's lucid and accurate study of the empire from Marcus Aurelius to Constantine, the latest volume in Dr. Cary's really excellent *History of the Greek and Roman World*, illustrates the failure of a military and bureaucratic despotism to make its subjects happy. The vast Empire, stretching from the Cheviots to the Euphrates and from the Danube to the Sahara, was held together, and barbarian assaults on all frontiers were repelled. But, in the century following the death of Marcus Aurelius, in 180, the many short-lived Emperors appointed and deposed by a greedy soldiery wrecked the economic foundations of the State. Heavy taxation and the burden of compulsory office-holding ruined the well-to-do, while the peasantry flocked to the towns and left the countryside desolate. Mr. Parker points out that some of the unhappy Emperors who followed in quick succession at the whim of the army or the prætorian guard were very able men. Aurelian, for example, who overthrew Zenobia's Palmyra with its brief hold over the Near East, was clearly a great general; he showed good sense in his financial and administrative measures, and was a generous conqueror. Claudius Gothicus, his predecessor, also appears to have been a soldier of unusual merit. Both men were natives of Illyria and depended largely on the support of the Illyrian legions, the best fighting troops in the service. But none of these fleeting phantoms had the statesmanship of Diocletian and Constantine, the two soldiers who, in the half-century from 284, reorganised the Empire and gave it a new lease of life.

Mr. Parker adds to his narrative valuable chapters on the army with its medley of races, on the administration, and on the religions of the Roman dominions, and shows how Christianity appealed more and more strongly to a desperate and sorely-stricken world. Constantine, though not fully converted till his last days, recognised the superiority of the Christian Church as a means of binding together the many races in unity. And, in Mr. Parker's view, Constantine, before his march on Rome in 312, was firmly "convinced that, under the banner of Christ, he would become victorious over his enemy," and therefore had the Christian monogram inscribed on his men's shields. Thenceforth Christianity became the official religion of the Empire and spread throughout the Roman world and beyond it. Barbarians were, in the next century, to overrun the Western Empire, but the new Constantinople, founded on the site of old Byzantium in 330, was to remain a bulwark of Christian civilisation in the East for over eleven centuries. Mr. Parker's interesting book, with its full annotations and useful maps, may be warmly commended.

Steady Drummer. By STANLEY CASSON. (Bell. 12*s.* 6*d.*)

That a classical scholar and archæologist should have been allowed, in the Great War, to serve on the Front where his civilian knowledge could be of some use was an event to be piously hoped for, but certainly not expected. Yet this was what happened to Mr. Casson, and to this lucky event we are indebted for one of the most entertaining volumes of war reminiscences that it has been our good fortune to come across. There is, of course, a catch somewhere: Mr. Casson was not *intended* to serve on the Macedonian Front. Only the fortunate accident of a cushy wound in the leg, acquired in the Ypres Salient, brought his knowledge of Greece before the War Office. The result is what will probably be the classic account, from the individual soldier's point of view, of one of the oldest campaigns known to history.

Disillusionment is the keynote of the book. The trouble with the Salonika campaign was that it gave the participants time to think, a dangerous and disheartening pastime in days of war. By tradition a thinker, Mr. Casson felt the miasma worse than many—though, happily, he was not troubled by the physical miasma of the country, malaria. Yet in the intervals of dubious quietude he was able to appreciate the utter loveliness of the Balkan hills and Balkan flowers (this is the first time we have seen justice done to the pure physical charm of Macedonia), while quite unable to carry on in spare moments the study of the Greek he loved. We ourselves recollect an abortive attempt to construe the text of an *Orestes*, presented to us by a classically-minded colonel in Cairo for use in the field. We dispute the author's recollection of the kilo-stones on the Seres Road; surely Orljak Bridge was nearer 80 K. than 70 K.

The brilliant passages describing the "War" in Old Greece and the aftermath in Constantinople and in Turkestan throw light on some little known chapters of the War, but these experiences did not serve to lighten the author's feeling of the futility of it all. Quite the reverse. And the last page of all is pregnant with warning against the way affairs are shaping to-day.

For all Mr. Casson's skilful lightness of touch, the book embodies the eternal outcry of the constructive scholar against the destructive politician. Stanley Casson, the Officer in the East, will rank with John Gibbons, the Private in the West, as the truest interpreter of the civilian soldier's impotent disgust with the unholy devil's brew that we call international politics.

The Biology of Flowers. By W. O. JAMES and A. R. CLAPHAM. (Oxford University Press. 8*s.* 6*d.*)

This is a laboratory manual describing the development of the chief types of flowers to the stage of fertilisation, with examples to show different types of pollination-mechanism. The diagrams are very clear and there are some specially good half-tone blocks of floral development. The book will be a boon to examination candidates, and a useful book of reference. But why do English botanists so often preface their account of

floral mechanisms by an arid chapter on the technical names of types of inflorescences, without any suggestion that these have a part to play in securing pollination ?

With one other point we must quarrel, without denying the utility of the book. On what grounds is "the examination of floral structure with no more elaborate apparatus than a hand lens "recognised as "of great educational value ? " Research has shown that little is gained from descriptive work that merely follows a routine formula—however good that formula may be. Hence, while the book could be used by beginners, it will be safer in the hands of those who intend to specialise in the subject, for whom, in fact, it is really meant.

Plant Life. By D. B. SWINGLE. (Chapman and Hall. 15*s*.)

The modern tendency, stronger perhaps in America than in England, to study structure in terms of function, finds another exponent here. Yet this differs from ordinary textbooks. It is evidently not written with examinations in view, but presents the science of Botany, its aims and problems, as a subject that is still developing. The treatment is definitely educational. It is accurate and full enough to form a foundation for those who will afterwards specialise, and yet is sufficiently simple to be a first course for older students who want to enlarge their scientific background.

The introduction gives a short but admirable chapter outlining the development of Botany. This is followed by an account of the general build and functions of the higher plants, and by a fuller section of Systematic Botany, giving the life histories of a large selection of plants with suggestive indications of problems in their relationships. The author manages to avoid teleological argument—that trap for beginners—and to stress the tentative nature of some of our explanations of living processes. There is no section on Ecology, and Plant Physiology is treated only in outline, but all the usual difficulties of students have been foreseen and countered. Detailed description of experiments is omitted—apparently on purpose. Certainly there is a gain in continuity and, taken in conjunction with a course of experimental work, this would be a very good book indeed. The language is accurate yet simple, and the illustrations, many of which are from photographs, are clear and well placed. There is a glossary and a fairly good index. Professor Swingle is distinctly to be congratulated.

The Romance of Gardening. By F. KINGDON WARD. (Jonathan Cape. 10*s*. 6*d*.)

This is a book for garden lovers rather than a gardening book. It does not tell you how to garden, but consists of a group of essays on subjects connected with beautiful gardening, followed by some chapters on the plant-hunting, for which the author is so well known.

As an essayist Mr. Kingdon Ward is not as good as he is in straightforward narrative—perhaps the secret is divulged in the preface, where he tells us that he has tried " to link such diverse yet kindred subjects as plant-hunting, gardening, and the science of botany." His topics are diverse and he can be annoyingly disjointed, but in spite of this the book grows on one. The author's travels enable him to stand outside and poke mild fun at our habitual English points of view. We have, apparently, no real English garden, but only collections of flowers ; we like quantity at our flower shows, and admire double flowers because they are unusual when they are really sterile abortions. It is refreshing to be told that Queen Elizabeth never saw horse chestnuts in bloom, and that the face of England, which we try so hard to preserve unchanged, has already changed a score of times.

The scientific side of plant-hunting is very well dealt with. A clear and interesting account is provided of problems connected with alpines and climatic conditions and of the aims and scope of plant geography. Here the author is illuminating for the scientist, owing to his expert knowledge of plants at all seasons, and manages to make the layman see where scientific matters touch his interests.

The last five chapters, which are worth all the rest of the book, describe the author's experiences when finding new flowers. We turn aside with him into some unexplored valley and find it a mass of bloom. Every plant had to be marked down and visited a second time to get the fruit, sometimes beneath the snow. This is good straightforward writing that makes the mouth of a gardener water by its vivid descriptions of plants.

There are some excellent photographs at which it is ungrateful to cavil, but—what a book this would be if illustrated in colour !

Over African Jungles. By MARTIN JOHNSON. (Harrap. 12*s*. 6*d*.)
Land of Elephants. By COUNT Z. SZECHENYI. (Putnam. 12*s*. 6*d*.)
Südsee. By HUGO BERNATZIK. (Constable. 10*s*. 6*d*.)

As examples of how the photographer's art has advanced in recent years in providing representations of wild life, whether human or animal, and of the scenery of the distant places of the earth, these three books are admirable. Perhaps the palm must be awarded to Mr. Bernatzik, both for lavishness and for technique, but there is very little in it.

As to the text there is not a great deal to be said. The books are aimed at a wide lay public and offer little that is new to the student of natural history or anthropology. Mr. Johnson deals with Africa from the airman-photographer's point of view. His chapters on Lake Rudolf and the Pygmies are especially entertaining, and he knows how to deal with the African native. One's curiosity is raised by the question about coffins asked at the airport of Mersa Matruh. Mr. Johnson evidently does not know why the inquiry is made, and we should imagine very few other people do either. Count Z. Széchenyi is frankly a big-game hunter, and his work contains some interesting anecdotes about lions. Lake Rudolf has attracted his attention also, and to good purpose.

In *Südsee* we have a book of a somewhat different calibre. Of the three parts into which the book is divided the two most important deal with the Solomon Islands (Owa Raha and Choiseul) and with New Guinea. The detailed descriptions of native customs and craftsmanship are keenly observed, though from a curiously subjective standpoint. The German " high priest " of Owa Raha, and the remains, on Choiseul, of a culture that may be allied to that of Easter Island, are out-of-the-way curiosities that are allotted due prominence ; and a word in season is given to the excellent administration of New Guinea. We doubt, however, whether the temperature, even in a " monopoly-steamer " cabin, ever rose to 197° Fahr. unless the ship was ablaze ; but this is probably a translator's mistake.

We can heartily recommend any of these three volumes to those who would gain a really clear visual impression of the countries and people with which they deal.

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